

203

m. rethelene.

Title:

RC 841⁵ Data Display Terminal

Technical manual

Provisional



A REGNECENTRALEN

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RCSL No: 52-AA673

Edition: - July, 1977

Author: J. Carøe

Keywords:

RC 841 Data Display Terminal, VDU 100, DTI 100.

Abstract:

This paper describes a teletype compatible display terminal based on the RC 840 Data Display System.

(pages).

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General Information for RC 841 Data Display Terminal



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This paper describes a teletype compatible display terminal based on the RC 840 Data Display System. This manual is part of the Technical Manual for RC 841 Data Display Terminal, but it may be distributed and read as an individual manual.

(pages).

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INTRODUCTION

1

The RC 841 is a Teletype^{*)} compatible ^{Data} display Terminal, complete with 15" alphanumeric CRT, a separable keyboard, memory and asynchronous communication interface.

The RC 841 is a member of the RC 840 ^{Terminal} Data Display family, and it will therefore be possible to upgrade or downgrade this display terminal by exchanging the interface board(s).

The RC 840 ^{Terminal} Data Display system being the basic hardware for a complete family of Data Displays consists of a 15" monitor, a Storage and Monitor Logic module (SML) and a power supply. These functional units are housed in a cabinet, which also provides space and supporting facilities for a great variety of interfaces.

Considering e.g. a data entry terminal, a TTY^{*)} compatible display terminal, a polled terminal, or a format oriented terminal, they all need to have the same basic functions: monitor, memory, cursor logic, timing circuits etc.

As a consequence of this the RC 840 ^{Terminal} Data Display system is designed to cover these general functions, and dedicated versions are realized by different interface boards and keyboards.

The RC 841 Data Display terminal pays much attention to the convenience of the operator; therefore, the display is supplied with a non-glare surface and movable low-profile keyboard, and it is, of course, designed to work quietly, without any blowers. Hard copy printer output and video output (composite sync.) are standard features.

^{*)} Teletype (TTY) is a registered tradename of Teletype Corporation, Skokie, Illinois.

Other highlights of this terminal are:

Upper/lower case character set

Most European character sets available

(Optional: extended character set with 256 displayable characters)

Roll mode

Tape mode (all 128/256 characters displayable)

Addressable cursor

25 lines of 80 characters

Transmission speeds: 50 to 9600 bits per second

Attractive styling

Modular construction with only 4 main modules, which facilitates easy maintenance

SPECIFICATIONS

2

Display capacity:	2000 characters at 50 Hz, 1920 characters at 60 Hz.
Display type/size:	P31 - green phosphor - 15" diagonal (20 x 26 cm).
Characters per line:	80.
Lines of display:	25 (at 60 Hz only 24).
Character generation:	5 x 7 dot matrix within a 7 x 11 dot field to provide lower case descenders. (At 60 Hz only 24 lines can be displayed in a 7 x 10 dot matrix).
Character size:	5 x 3 mm.
Character set:	Full upper/lower case Danish alphabet. 128 characters may be stored and displayed (tape mode).
Refresh rate:	50/60 Hz, phase locked to the mains.
Communication rates/mode:	50-9600 bps, asynchronous, half or full duplex.
Communication format:	1 start bit, 7 data bits, 1 parity bit, and 1 stop bit. Even parity is used. (Other formats are strappable).
Memory:	Static MOS memory, 2048 x 9 bit.
Keyboard:	Typewriter layout with the possibility of generating all 128 characters.
Cursor:	Addressable X-Y coordinates. Non-destructive, blinking character. Blink frequency: 3 Hz.
Special functions:	Up, down, right, left, home, return. Erase to end of screen, erase to end of line, Clear, printer on and printer off. <i>These functions are performed by means of the control button and the respective characters</i>
Alarm:	Audible and visual alarm on alarm code (BELL). The visual alarm is placed on the keyboard and it will stay set until reception of the next RETURN (CR), DELETE (DEL), or NUL character. Audible alarm also at character position 72 of the line.

Interface line: CCITT V.24 (RS 232 C) compatible. Indicators for Carrier Detect and Clear To Send.

Interface printer: CCITT V.24 (RS 232 C) compatible. Computer or keyboard controlled. Indicator for Printer ON.

Video output: Composite sync.

Options: Any character set, which can be performed within a 7 x 11 dot matrix.
~~Extended character set with 256 characters.~~

Dimensions:	<u>Display</u>	<u>Keyboard</u>
Height:	49.5 cm	7 cm
Width:	41.5 cm	48 cm
Depth:	52 cm	22 cm
Weight:	35 kg	6 kg

Operating environment: 10°C to 40°C operating,
0°C to 50°C non-operating.

Humidity: 0 to 95% (non-condensating)

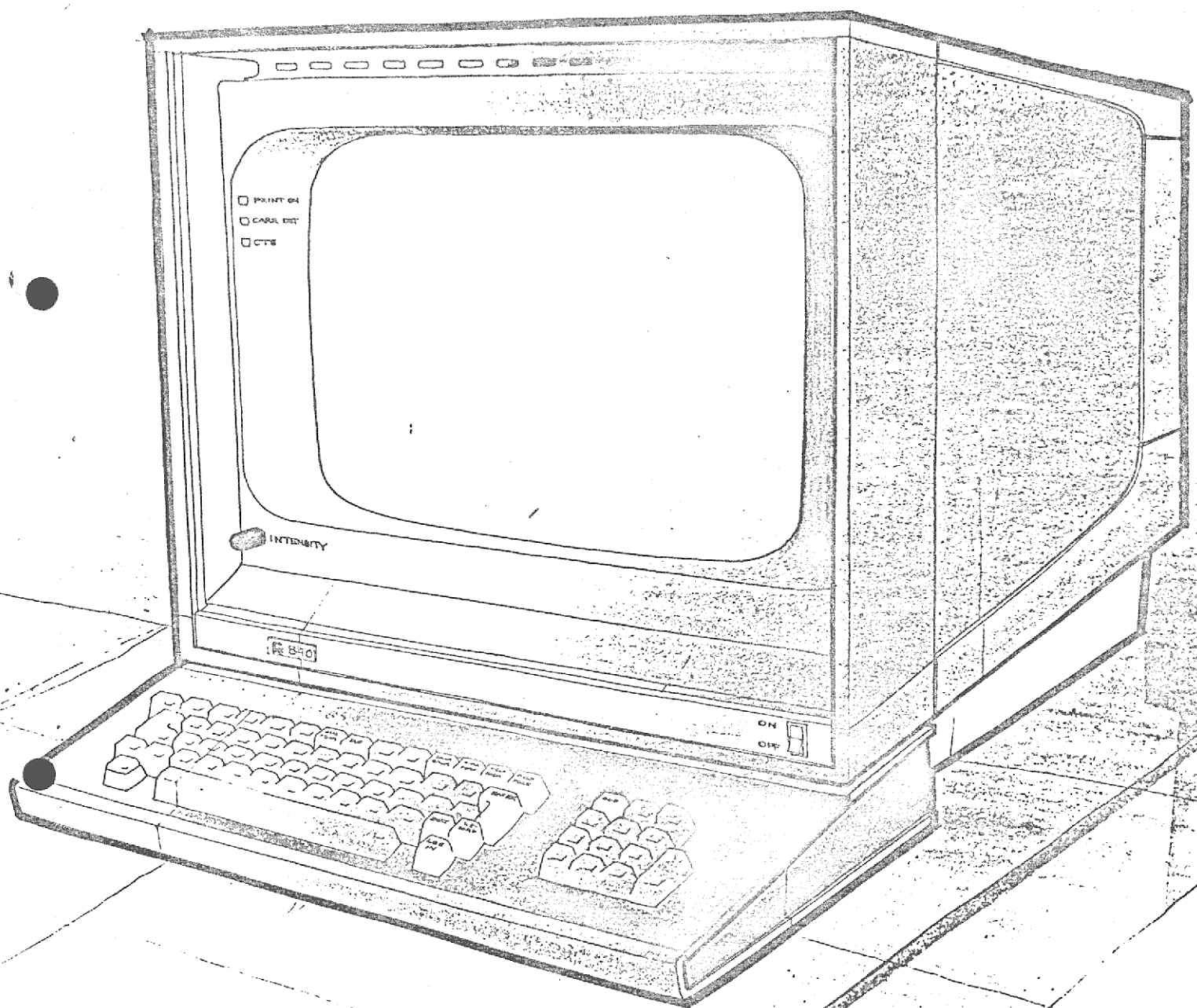
Power: 100/120/220/240 VAC $\pm$ 10%
50/60 Hz $\pm$ 2 Hz.
80W. 288 joule.

Factory set to: 220 VAC $\pm$ 10%.
50 Hz $\pm$ 2 Hz.

Fuses: Mains: 220-240V, 1A, 250V SB.
100-120V, 2A, 250V SB.

Monitor: 1A, 250 V SB.

+ 5V: 6A SB.



RC 841

Fig. 2.1. RC 841 Data Display Terminal

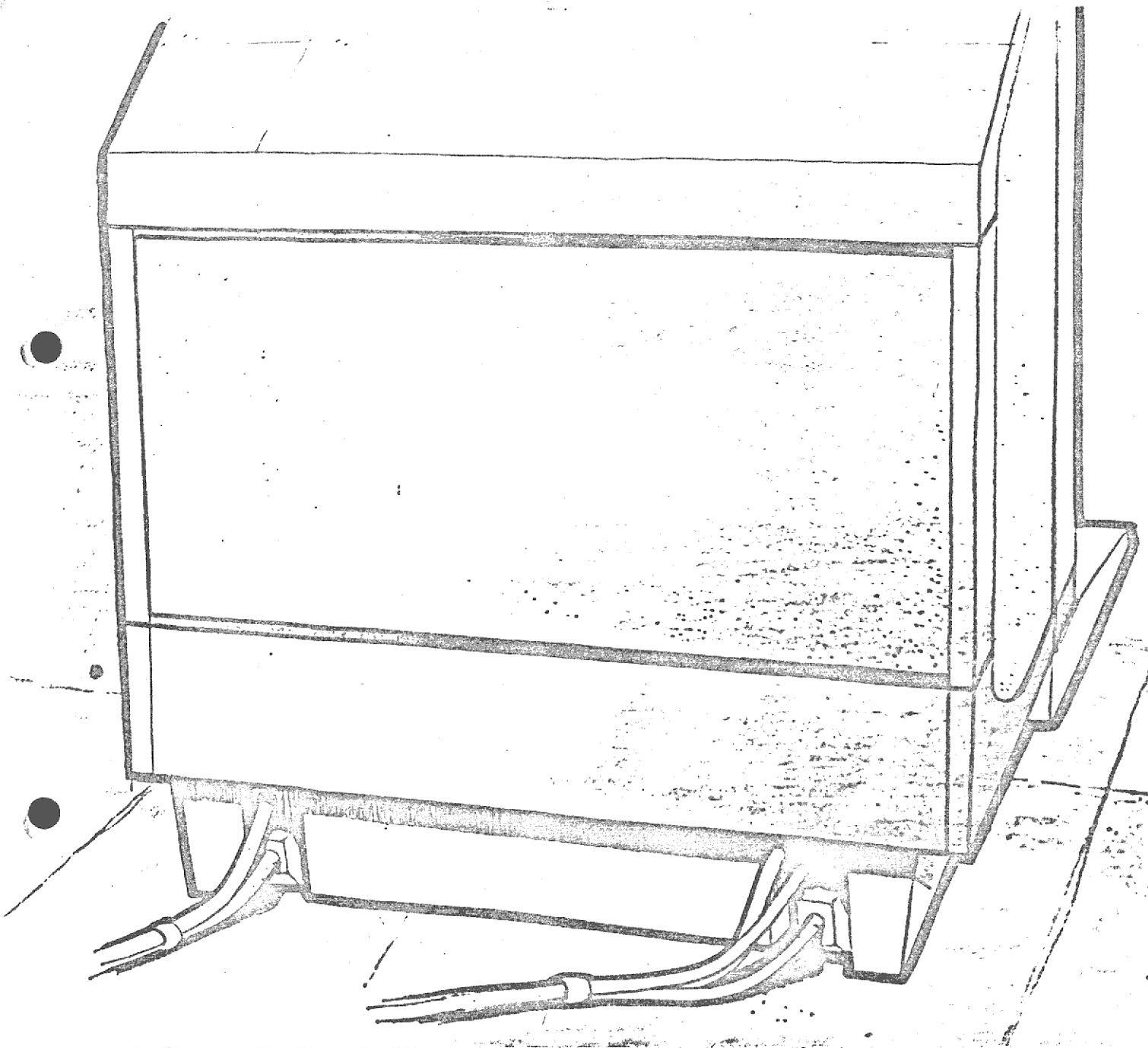


Fig. 2.2. RC 841 Data Display Terminal
Rear View

The RC 841 Data Display Terminal is composed of the following items:

- VDU 100 - Visual Display Unit
 - including MON 104 Monitor
 - and SML 100 Storage and Monitor Logic
 - and PSU 801 Power Supply
- DTI 100 - Data Terminal Interface
- KBU 204 - Basic Keyboard Unit
- CBL 440 - Power Cable
- TF 1xx - Terminal Feature, contains information about keyboard layout, -cable and character generation.
- TF 5xx - Terminal Feature, informs about cables to the dataset or computer.

xx indicates numbers that may change from layout to layout (Danish, German etc.) and from system to system.

Visual Display Unit, VDU 100

3.1

The VDU 100 is the displaying part of the RC 841 Data Display Terminal, to which the keyboard, the line cable and a possible hard copy printer are connected.

The VDU 100 includes the 15" monitor MON 104, the Storage and Monitor Logic SML 100, and the Power supply PSU 801. The following chapters briefly describe the individual units (see also fig. 3.1 and 3.2).

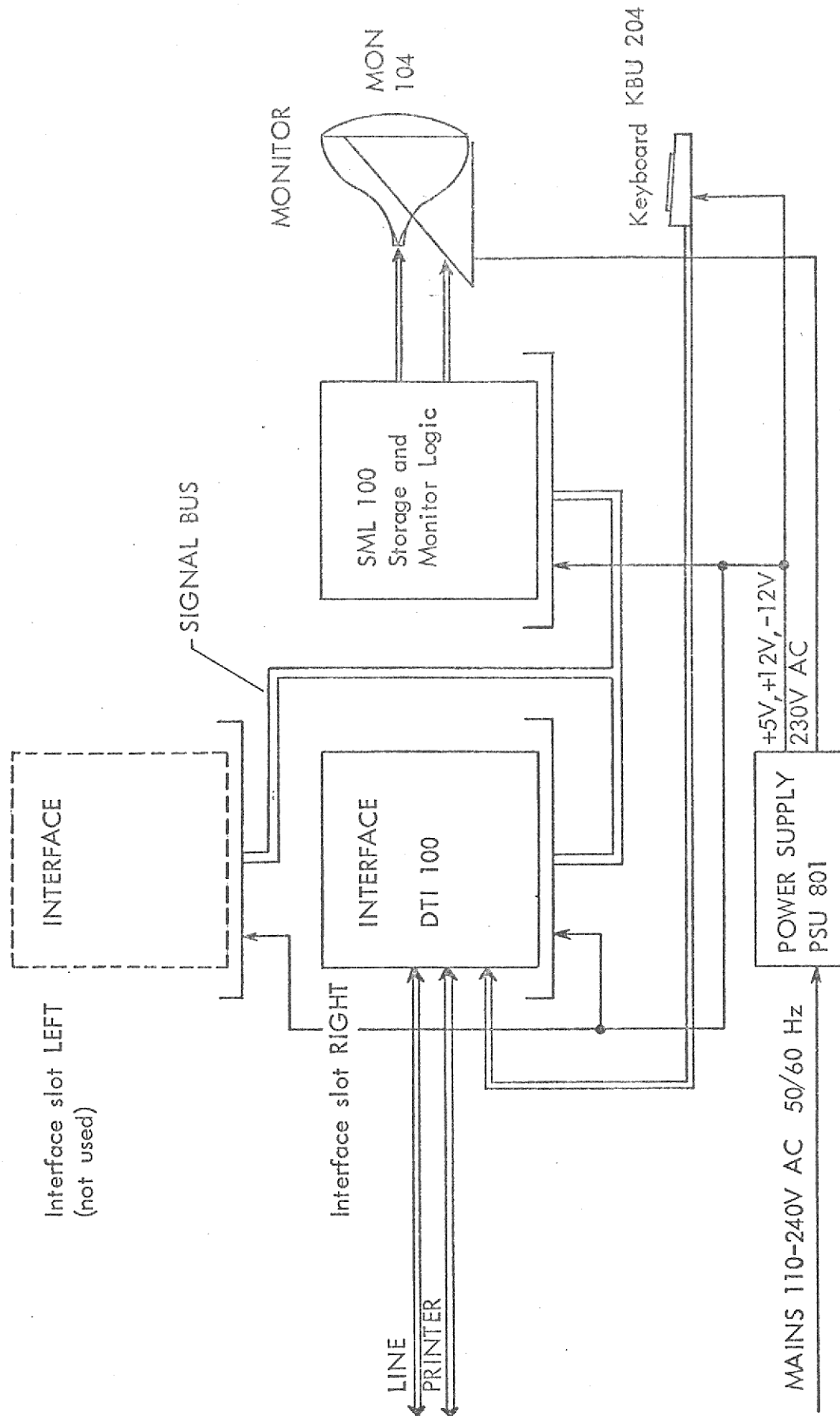


Fig. 3.1. RC 841 Data Display Terminal Functional Modules

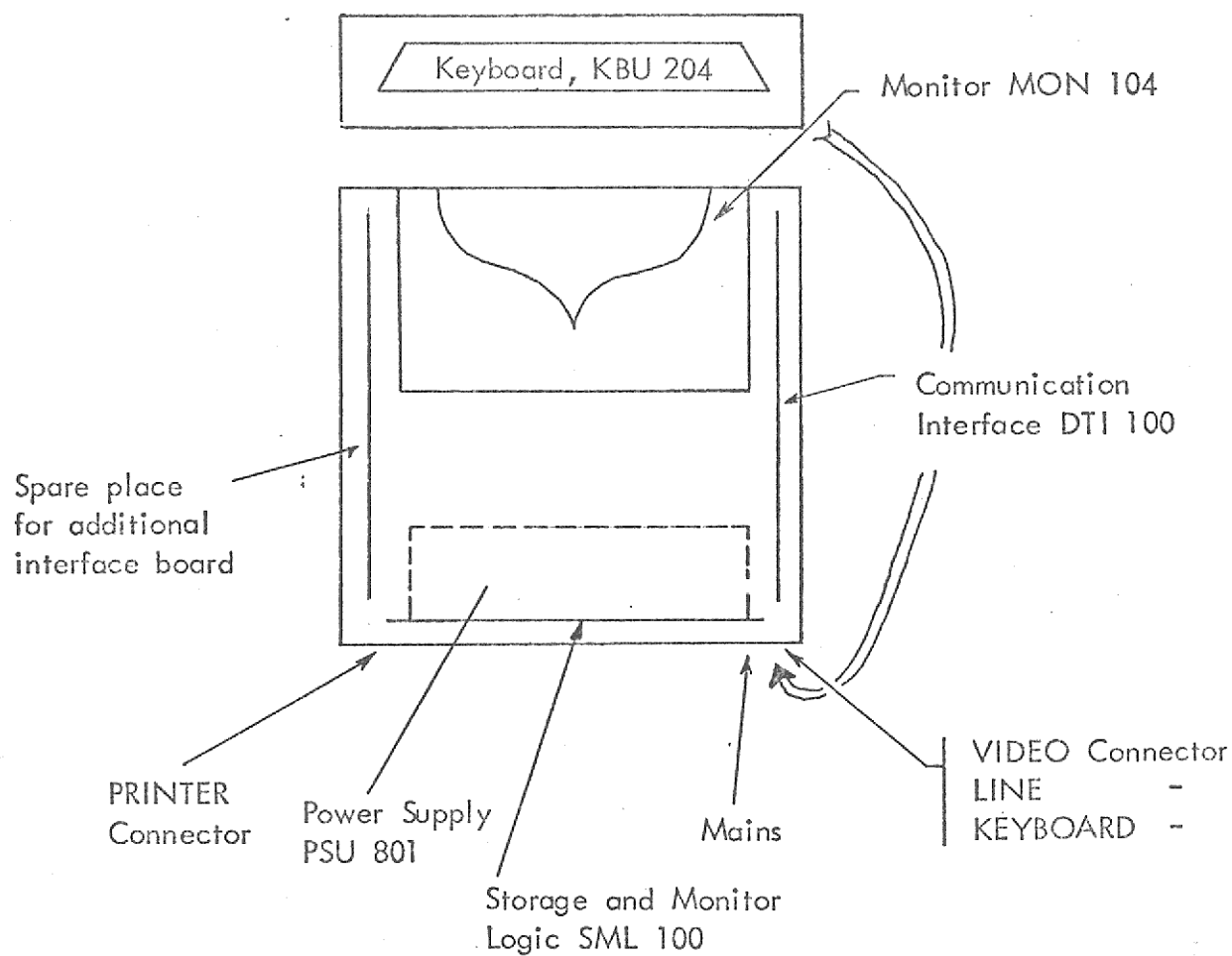


Fig. 3.2. RC 841 Data Display Terminal Physical Layout

Monitor MON 104

3.1.1

The 15" (diagonal) monitor MON 104 is the unit which displays the data generated by the SML 100.

The MON 104 is supplied with non-glare (antireflex) surface and is supplied from a 230V outlet of the main transformer.

Further information about MON 104 in section 3 of the Technical Manual.

Storage and Monitor Logic, SML 100

3.1.2

This module contains the logic units, which are always necessary, independent of the type of display terminal one may wish.

These units are:

Timing Circuits, the heart of the logic, which synchronizes and generates all timing needed for storage and display of data.

Memory Circuits, including the MOS memory and additional control logic for storage of data and calculation of addresses.

Horizontal Cursor Logic and

Vertical Cursor Logic, two functional units, equal in functions, which control the cursor position, both during data input and output and during erase of the memory or parts of it.

Video Generator Logic, which converts the data of the memory, by means of a character generator, to the serial video signal supplied to the monitor. Also the composite sync video signal is generated here.

Power Supply, PSU 801

3.1.3

The power supply supplies all units of the terminal with power including the keyboard.

The voltages available are:

230VAC for the MON 104,
+ 5V, + 12V, - 12V.

Further information in section 3 of the Technical Manual.

Data Terminal Interface, DTI 100

3.2

This module is an asynchronous communication interface, which transfers data between the keyboard and a transmission line and between the transmission line and the memory; also the printer connection is controlled by this interface.

The logic units of this interface are:

Microprogram, which controls the interface and the external controls of the SML 100.

Universal Transmitter and Receiver, which converts the keyboard data to serial information and on the other hand converts the received serial information to parallel data suitable for the memory.

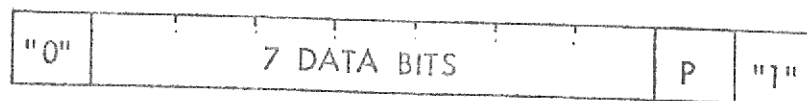
Line Circuits, these circuits convert the internal voltage levels to those recommended by CCITT V.24 (RS 232 C) and vice versa. Also the connection to the hard copy printer is controlled by these circuits.

Communication Modes

3.2.1

The DTI 100 transmits in asynchronous mode 1 start bit, 7 data bits, 1 parity bit, and 1 stop bit in either HALF DUPLEX or in FULL DUPLEX (switch on rear of the terminal).

Data Format:



Even parity is used.

Optionally there may be 8 data bits, the parity may be odd or omitted, and there may be 2 stop bits (please see chapter 5.2 - Strapping Possibilities).

In HALF DUPLEX (switch on the rear of the terminal) all entries from the keyboard are sent to the computer and at the same time written in the memory and displayed on the screen.

In FULL DUPLEX all entries from the keyboard are sent to the computer only and from there they may be echoplexed to the terminal. The computer controls all output to the terminal and may control all functions mentioned in chapter 4.2 - Character Set.

The TAPE mode is selected by a switch on rear of the terminal. In this mode all 128 characters will be stored and displayed, and no functions will be executed. This mode may be of great advantage during trouble shooting of line errors or program errors.

Keyboard Unit, KBU 204

3.3

This is the basic keyboard unit without any layout (i.e. without switches and key tops). For further information on KBU 204, see section 3 of the Technical Manual. The keyboard unit includes also a PROM (Programmable Read Only Memory) which enables individual code sets for each layout. Each layout and code will be defined by a Terminal Feature - TF 1xx - where xx may vary depending on the layout and character set.

Information on specific Terminal Features may be found in chapter 4, TF 135 - Danish layout or in section 5 of the Technical Manual: FCO's, ECN's, and Terminal Features.

In principle, all keys but CTRL, SHIFT, and SHIFT LOCK address the PROM when they are depressed. From the PROM a data character is transferred to the Visual Display Unit.

When CTRL is used along with another key, the bits 6 and 7 will be suppressed in order to issue control characters (0-31₁₀).

When activating the SHIFT or SHIFT LOCK the upper area of the PROM (addresses 128 to 255) is addressed and data characters from here issued.

All keys are self-repeating except CTRL, SHIFT, and SHIFT LOCK, i.e. that whenever a key has been activated for more than 0.5 sec., it will be repeated 5 times/sec. as long as the key is depressed.

Terminal Feature, TF 1xx

3.4

The Terminal Feature is the tool with which the RC 841 becomes an operable Data Terminal. The TF 1xx contains information about keyboard layout, character generation, character conversion etc.

The major modules, which are specified in TF 1xx, are:

KBU yyy: Exact keyboard layout for KBU 204 including number of switches and engravings. Included is also the programming information of the PROM code converter.

Character generator and character converters for the display unit (VDU 100).

Signal cable from keyboard to VDU 100.

In the following chapters the Terminal Feature TF 135 Danish layout is described. Terminal Features for other layouts will be described in self contained sections, which may be added to the Technical Manual, Section 5, FCO's, ECN's, and Terminal Features.

TF 135 - DANISH LAYOUT

4

This Terminal Feature describes the Danish layout which will be standard, when no option is requested.

The TF 135 describes:

KBU 147	Keyboard Layout
UCG 101	Universal Character Generator
CCO 101	Character Converters
CBL 532	Signal Cable

Keyboard Layout

4.1

This layout, called KBU 147, is shown in fig. 4.1.

Included is also the PROM code converter; this PROM assigns a specific code to each key in accordance with the engraving of the key. See fig. 4.2. This keyboard layout is based on the basic keyboard unit KBU 204, see section 3 of the Technical Manual.

Character Set

4.2

The standard character set will be upper/lower case DANISH alphabet as described in fig. 4.2. The ASCII set and most European character sets are available on request. These alphabets are all included in the Universal Character Generator UCG 101, and they may be captured by means of the CCO Character Converter (factory installation). (See chapter 4.3).

Control Characters

4.2.1

The RC 841 Data Display Terminal is designed to transmit and receive data and controls at a rate of up to 9600 bps. and to perform all functions with no additional control- or PAD-characters.

PROM Code Set

Fig. 4.2: KBU 147

0	0	7	7	0	0	0	0	1	1	1	1
0	0	6 BITS 6		0	0	1	1	0	0	1	1
0	1	5	5	0	1	0	1	0	1	0	1
CONTROL		4	3	2	1	CONTROL		DATA			
NUL	DLE	0	0	0	0	U	..	0	@	P	p
SOH	DC1	0	0	0	1	à	â	1	A	Q	q
STX	DC2	0	0	1	0	ñ	ñ	"	2	B	R
ETX	DC3	0	0	1	1	£	§	#	3	C	S
EOT	DC4	0	1	0	0	⌘	ù	\$	4	D	T
ENQ	NAK	0	1	0	1	ü	è	%	5	E	U
ACK X-Y ADDRESS	SYN	0	1	1	0	Ä	ö	&	6	F	V
BEL	ETB	0	1	1	1	Ë	ë	'	7	G	W
BS	CAN	1	0	0	0	ç	ç	(	8	H	X
HT	EM	1	0	0	1	õ	ì	)	9	I	Y
LF	SUB	1	0	1	0	É	é	*	:	J	Z
VT	ESC	1	0	1	1	[	{	+	;	K	Æ
FF	FS	1	1	0	0	\		,	<	L	Ø
CLEAR		1	1	0	0						
CR	GS	1	1	0	1	]	}	—	=	M	Å
RETURN	HOME	1	1	0	1						
SO	RS	1	1	1	0	ö	α	.	>	N	^
PRINT ON	EOL	1	1	1	0						
SI	US	1	1	1	1	ö	÷	/	?	O	—
PRINT OFF	EOP	1	1	1	1						

NOTE: Displayable characters only displayable in TAPE mode.

DEL

Fig. 4.3. Universal Character Set

X

The control characters (0-31₁₀) are interpreted as follows: Characters not mentioned will have no function except in TAPE mode, where they will be written and displayed as shown in fig. 4.2.

NOTE: CTRL () means the CONTROL key depressed together with the mentioned character key.

[] indicates octal, decimal value

- ↖ - HOME (GS, CTRL (Å)) [] - will return the cursor to first line, first character.
- - FORWARD CURSOR (CAN, CTRL (X)) [] - will advance the cursor one position to the right. The cursor will not move beyond the last position of the line.
- ← - BACK CURSOR (BS, CTRL (H)) [] - will return the cursor one position to the left. The cursor will not move beyond the first position of the line.
- ↑ - UP ROW CURSOR (SUB, CTRL (Z)) - will move the cursor up one line (row). The cursor will not move beyond the first line of the display.
- LF - LINE FEED (LF, CTRL (J)) - will move the cursor down one line (row). When the bottom line is reached, it will move data up one line, leaving the bottom line blank (ROLL mode).
- RETURN (CR, CTRL (M)) - will move the cursor to the first position of the line and clear the BELL indicator.
- BELL (BEL, CTRL (G)) - this code initiates an audible and visual alarm. When received the audible alarm will sound momentarily and the BELL indicator on the keyboard will be lit until reception of the next CR, DEL or NUL char.
- EOL - ERASE TO END OF LINE (RS, CTRL (^)) - this code will erase all data from the cursor to the end of the line.
- EOP - ERASE TO END OF PAGE (US, CTRL (_)) - this code will erase all data from the cursor to the end of the page.

CLEAR (FF, CTRL (L)) - this code will erase all data and home the cursor.

X-Y ADDRESS MODE (ACK, CTRL (F)) - this code will place the terminal in X-Y address mode. The next character will be the character address, and the following character will be the line address (see chapter 4.2.2).

PRINTER ON (SO, CTRL (N)) - this code will in full duplex cause all received data to be transmitted to the hard copy printer, in half duplex both received and transmitted data will be transmitted to the printer.

PRINTER OFF (SI, CTRL (O)) - this code will stop the transmission to the printer.

ESC - ESCAPE (ESC, CTRL (Æ)) - this code is transmitted only.

DEL - DELETE (DEL) - this code will clear the BELL indicator.

NUL - (NUL) - this code will clear the BELL indicator.

Cursor Addressing

4.2.2

The cursor may be positioned at any character position of the screen by using a 3-character sequence.

1st char.	2nd char.	3rd char.
-----------	-----------	-----------

ACK (Start Add. Mode)	CHAR. ADD	LINE ADD.
-----------------------	-----------	-----------

Relations between physical position and the character set is seen from fig. 4.3 and fig. 4.4.

Note: If character address > 80 or line address > 25 (24 at 60 Hz), the cursor will automatically be placed in position 0,0.

Character Address

<u>Character Position</u>	<u>DANISH Char. Set</u>	<u>Character Position</u>	<u>DANISH Char. Set</u>
1.	\	41.	H
2.	a	42.	I
3.	b	43.	J
4.	c	44.	K
5.	d	45.	L
6.	e	46.	M
7.	f	47.	N
8.	g	48.	O
9.	h	49.	P
10.	i	50.	Q
11.	j	51.	R
12.	k	52.	S
13.	l	53.	T
14.	m	54.	U
15.	n	55.	V
16.	o	56.	W
17.	p	57.	X
18.	q	58.	Y
19.	r	59.	Z
20.	s	60.	Æ
21.	t	61.	Ø
22.	u	62.	Å
23.	v	63.	^
24.	w	64.	_
25.	x	65.	space
26.	y	66.	!
27.	z	67.	"
28.	æ	68.	#
29.	ø	69.	\$
30.	å	70.	%
31.	~	71.	&
32.	Rubout	72.	'
33.	@	73.	(
34.	A	74.	)
35.	B	75.	*
36.	C	76.	+
37.	D	77.	,
38.	E	78.	-
39.	F	79.	.
40.	G	80.	/

Fig. 4.3

Row Address

<u>Row Position</u>	<u>DANISH Char. Set</u>	<u>Row Position</u>	<u>DANISH Char. Set</u>
1.	\	14.	m
2.	a	15.	n
3.	b	16.	o
4.	c	17.	p
5.	d	18.	q
6.	e	19.	r
7.	f	20.	s
8.	g	21.	t
9.	h	22.	u
10.	i	23.	v
11.	j	24.	w
12.	k	25.	x
13.	l		

Fig. 4.4

As seen from chapter 4.2 - Character Set, almost all European national letters are included in the character generator USG 101.

In order to build up the right character set for a specific nationality, a character conversion may take place before characters are used by the character generator. See fig. 4.5.

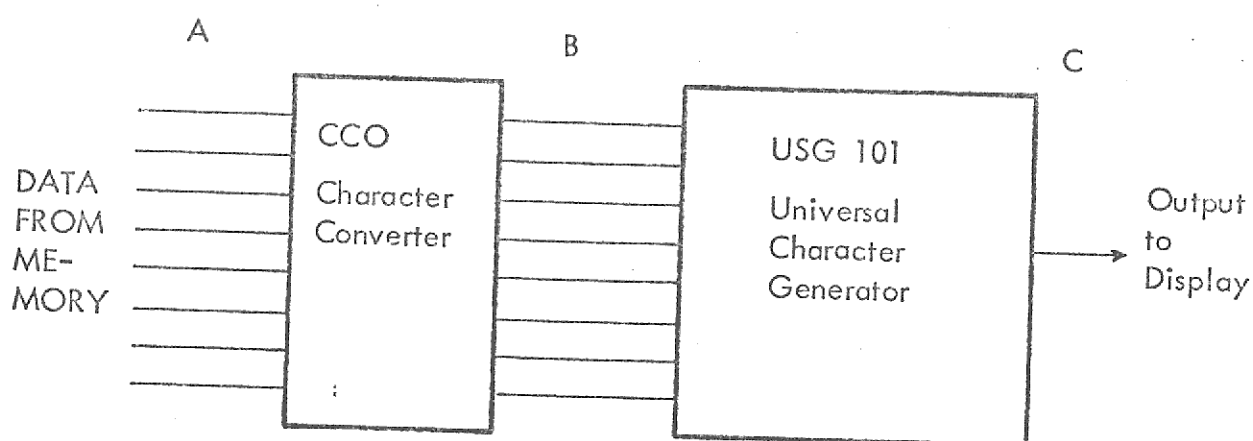


Fig. 4.5. Character Conversion Schematic

In this way any data character may be converted to another value before used by the character generator.

As seen from fig. 4.3, no conversion is needed for the Danish character set, and therefore CCO will be implemented by jumpers in this case, but should one need the ASCII character set, the following conversion will take place in CCO (then implemented by a 256 x 8 PROM):

Input data point A	Converted data point B	Output to be shown point C
133 ₈	013 ₈	[
134 ₈	014 ₈	\
135 ₈	015 ₈	]

and so on.

Should the German character set be needed, the following conversion will take place:

Input data point A	Converted data point B	Output to be shown point C
133 ₈	006 ₈	Ä
134 ₈	016 ₈	Ö
135 ₈	000 ₈	Ü

In TAPE mode the exchanged character will be shown in the area from 0 to 037₈. The German example:

	Input data point A	Converted data point B	Output to be shown point C
TAPE MODE	006 ₈	133 ₈	Æ
	016 ₈	134 ₈	Ø
	000 ₈	135 ₈	Å

Signal Cable, CBL 532

4.4

CBL 532 is the signal cable connecting the keyboard to the terminal. The cable is wired one to one.

INSTALLATION

5

Unpacking

5.1

To be supplied later.

Connection to Mains

5.2

Before connection to mains, it is of great importance to control, that the terminal is prepared for the mains voltage in question.

Through the window of the combined fuse and plug unit (on rear of the terminal, see fig. 2.2 and fig. 5.1), it shall be verified that the correct voltage level is set.

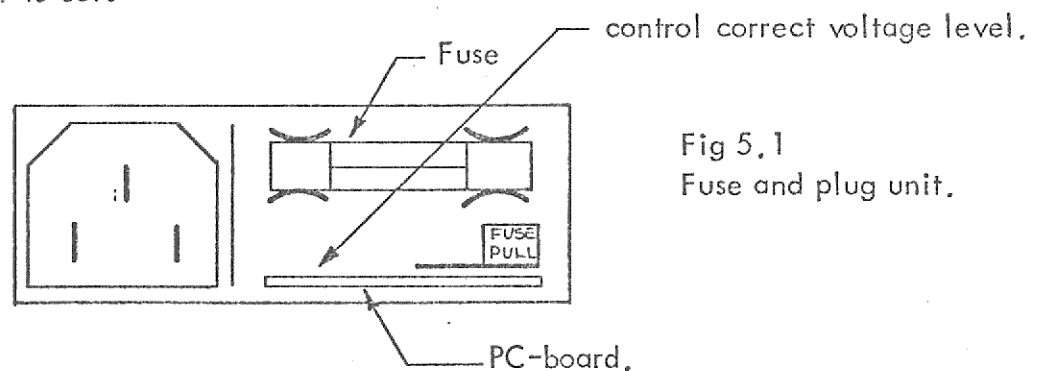


Fig 5.1
Fuse and plug unit.

If the voltage level has to be changed, push the plastic cover to the plug side, pull out the fuse and pull out the PC-board. Now turn the PC-board so that the correct voltage level is visible in the window of the fuse/plug unit.

Then mount the correct fuse (see SPECIFICATIONS), push back the plastic cover and connect to mains.

Strapping Possibilities

5.3

From the factory the internal strappings are set to meet the most common applications. If other settings should be wished, please contact RC.

Strapping of Communication Interface (DTI 100)

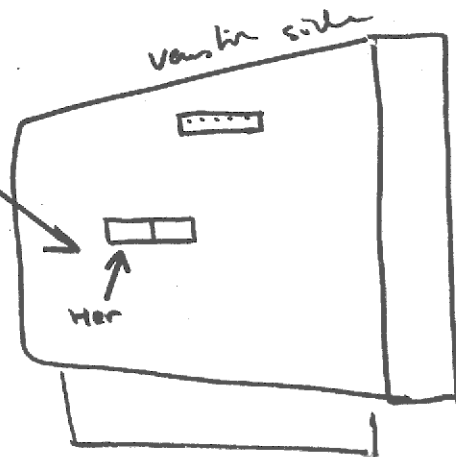
5.3.1

See fig. 5.2 for location of strapping fields.

NOTE: 1 means strap, 0 means no strap.

Transmit/Receive Speed (Field A)

Strap	1	2	3	4		
	1	1	1	1	N.A.	
	1	1	1	0	50	bps.
	1	1	0	1	75	-
	1	1	0	0	110	-
	1	0	1	1	134.5	-
	1	0	1	0	150	-
	1	0	0	1	300	-
	1	0	0	0	600	-
	0	1	1	1	900	-
	0	1	1	0	1200	-
	0	1	0	1	1800	-
	0	1	0	0	2400	- (factory set)
	0	0	1	1	3600	-
	0	0	1	0	4800	-
	0	0	0	1	7200	-
	0	0	0	0	9600	-



Number of Stop Bits (Field B - Strap 10)

1	1 stop bit (factory set)
0	2 stop bit

No Parity (Field B - Strap 9)

1	Parity bit will be transmitted and received (factory set)
0	Parity bit will <u>not</u> be transmitted

Odd/Even Parity (Field B - Strap 8)

1	Odd parity
0	Even parity (factory set)

Number of Data Bits per Character (Field B - Strap 7)

1	7 data bits per character (factory set)
0	8 data bits per character

Printer Output (Field B - Strap 1 and 2)

<u>Strap</u>	<u>1</u>	<u>2</u>	
0	0		N.A.
0	1		{ Full duplex: Only Received data to printer Half duplex: Keyboard and received data to printer (factory set)
1	0		
1	1		Only Received data to printer
			N.A.

Strapping of Storage and Monitor Logic (SML 100)

5.3.2

This module is strapped from factory according to the specifications mentioned in chapter 2.

If a data display terminal is to be upgraded, field instructions will be issued.

To be supplied later

Fig. 5.2

INTERFACE INFORMATION

6

Connections to the RC 841 are performed on the rear of the terminal (see fig. 2.2). Connection are:

LINE	Connector, Cannon type DB 25 S or equivalent
PRINTER	Connector, Cannon type DB 25 S or equivalent
KEYBOARD	Connector, Cannon type DB 25 P or equivalent
VIDEO	Connector, BNC type UG 1094/U or equivalent

LINE and PRINTER interface signals correspond to CCITT V.24 recommendations (RS 232 C compatible).

VIDEO output: Signal corresponds to the following specification:

Composite video 1.4V pp nom., negative modulation, 75 Ohm.

Blanking level: 0V.

Sync background - 0.4V nom.

Light level: + 1.0V nom.

European standard: 313 vertical lines, 50 Hz,
293 vertical video lines.

American standard: 261 vertical lines, 60 Hz,
241 vertical video lines.

KEYBOARD signals are TTL-signal levels.

Signal lists on the following pages.

ITT Cannon, type DB - 25S	
PIN	SIGNAL NAME
1	TRANSMITTED DATA RECEIVED DATA REQUEST TO SEND + 12V CLEAR TO SEND
2	
3	
4	
5	0 VOLT SIGNAL GROUND CARRIER DETECTED
6	
7	
8	
9	DATA TERMINAL READY + 12V
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	

Fig. 6.1. RC 841 Data Display Terminal
LINE Connector

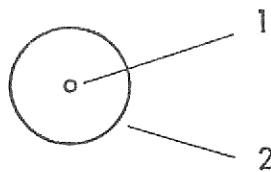
ITT Cannon, type DB - 25S	
PIN	SIGNAL NAME
1	SERIAL PRINT DATA
2	
3	
4	
5	
6	DATA SET READY + 12V
7	0 VOLT SIGNAL GROUND
8	CARRIER DETECTED + 12V
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	PRINTER READY
21	
22	
23	
24	
25	

Fig. 6.2. RC 841 Data Display Terminal
PRINTER Connector

ITT Cannon, type DB - 25P	
PIN	SIGNAL NAME
1	- 12 VOLT
2	
3	0 VOLT
4	
5	
6	
7	
8	
9	
10	7 ALARM LAMP
11	7 AUDIO ALARM
12	7 STROBE
13	0 VOLT
14	
15	
16	
17	BIT 5
18	BIT 6
19	BIT 7
20	
21	BIT 4
22	BIT 1
23	BIT 2
24	BIT 3
25	+ 5 VOLT

Fig. 6.3. RC 841 Data Display Terminal
KEYBOARD Connector

BNC, type UG 1094/U	
PIN	SIGNAL NAME
1	line video out
2	line 0 volt



BNC, type UG 1094/U

Fig. 6.4. RC 841 Data Display Terminal
VIDEO Connector

First Time Operation

7.1

Turn power on using the ON/OFF switch situated on the rear of the terminal. Wait 30 secs. for the raster to appear and adjust the BRIGHTNESS control to a suitable level. This adjustment will be easier if first the terminal is switched to half duplex (switch on the rear of the terminal) or a connection is made in the LINE-connector between pin 2 and pin 3. Hereafter a character should be depressed for several seconds to ensure that the automatic REPEAT-function fills up the screen with characters.

Now the display can be tested for all characters and functions, the latter by means of the function keys (Return, Line feed) or by means of the CONTROL (CTRL) key simultaneously depressed with the corresponding alphanumeric key (see chapter 4.2 - CHARACTER SET).

Indicators

7.1.1

When the CTRL-key is depressed together with the "G", the alarm will sound and the BELL-indicator on the keyboard is lit until Return (CR) is depressed. A DElete or a NUL character received on the line will also turn off the BELL-indication.

The indicator CD will indicate CARRIER DETECTED, and the indicator CTS will indicate CLEAR TO SEND, whenever the terminal is connected to a modem, which is properly connected to a computer system.

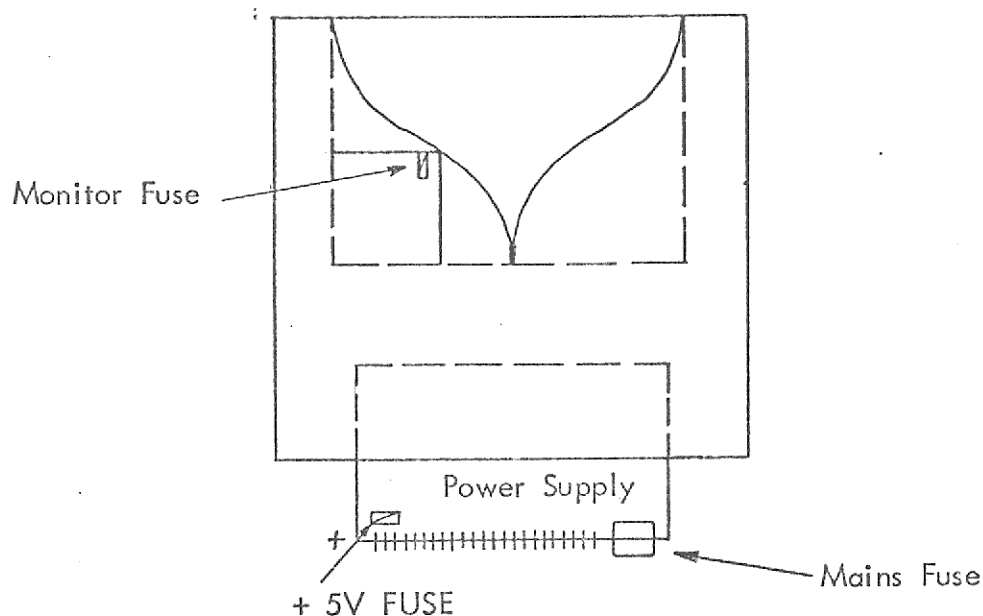
The indicator PRINTER ON is lit, when a hard copy printer is properly connected, the printer power is turned on, and the PRINT ON control character has been received. The indicator will turn off, when the PRINT OFF control character is received or printer power is turned off.

If no raster should appear even if the BRIGHTNESS control is turned clockwise, please disconnect the POWER cable and ensure that the main fuse, situated in the combined mains and fuse plug, is okay. If this fuse is okay, then remove the cover.

NOTE: Cover must never be removed or mounted with mains connected.

Now the Monitor Fuse and the + 5V Fuse shall be examined, and, if blown, exchanged with a fuse with the specifications mentioned in SPECIFICATIONS.

If no fuses are blown, please let the mains plug stay removed and call the nearest RC Technical Service Department.



absolute maximum ratings

Voltage at Any Pin With Respect to V_{SS} +0.3V to V_{SS} -20V
 Power Dissipation 700 mW
 Storage Temperature Range -65°C to +150°C
 Operating Temperature 0°C to +70°C
 Lead Temperature (Soldering, 10 seconds) 300°C

dc electrical characteristics

T_A within operating range, $V_{SS} = +5.0V \pm 5\%$, $V_{GG} = -12V \pm 5\%$, unless otherwise specified.

PARAMETER	CONDITIONS	MIN	TYP (NOTE 3)	MAX	UNITS
All Inputs					
Logical High Level (V_{IH})	$V_{IH} = -10V$, $T_A = 25^\circ C$	$V_{SS} - 1.5$		$V_{SS} + 0.3$	V
Logical Low Level (V_{IL})	All Other Pins GND	$V_{SS} - 18$		$V_{SS} - 4.2$	V
Leakage	$V_{IH} = 0V$, $f = 1.0$ MHz		0.01	0.5	μA
Capacitance	All Other Pins GND (Note 1)		3.5	7.0	pF
Output Levels					
Logical High Level (V_{OH})	Isourcing = 0.5 mA	$V_{SS} - 2.6$		$V_{SS} - 4.6$	V
Logical Low Level (V_{OL})	Isinking = 1.5 mA				V
Power Supply Current (I_{CC})	$f = 1.0$ MHz		25	35	mA

ac electrical characteristics

T_A within operating range, $V_{SS} = +5.0V \pm 5\%$, $V_{GG} = -12V \pm 5\%$, unless otherwise specified.

PARAMETER	CONDITIONS	MIN	TYP (NOTE 5)	MAX	UNITS
Master Frequency			1.5	1.0	MHz
Access Time (T_A)	$C_L = 50$ pF (Note 2)	0.01		16	μs
Reset Delay Time (t_{RD})	$f =$ Master Clock Frequency			$500 \pm 4/f$	ns
Reset Pulse Width (P_{RW})		$500 \pm 4/f$			ns
Output Delay From Reset (t_{OP})				$500 \pm 4/f$	ns
Output Duty Cycle	$T =$ Output Period $f =$ Master Frequency		$0.5T \pm 1/f$		

Note 1: Capacitance is guaranteed by periodic measurement.

Note 2: Access time is defined as the time from a change in control inputs (A, B, C, D) to a stable output frequency. Access time is a function of frequency. The following formula may be used to calculate maximum access time for any master frequency: $T_A = 2.6 \mu s + 1/f \times 13$, f is in MHz.

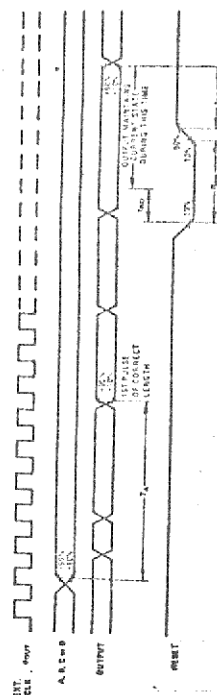
Note 3: Typical values for $T_A = 25^\circ C$, $V_{SS} = 5.0V$ and $V_{GG} = -12V$.

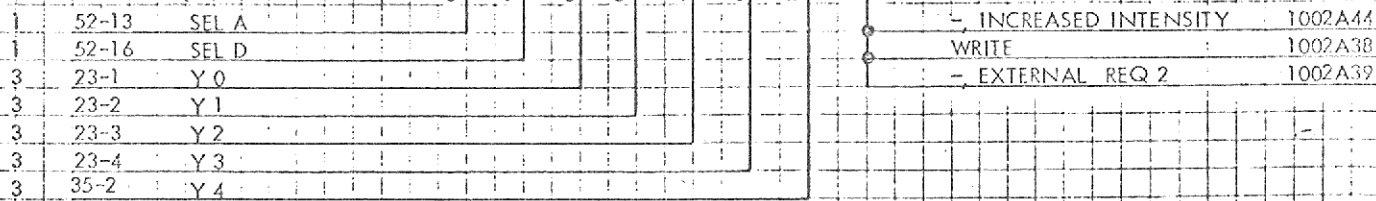
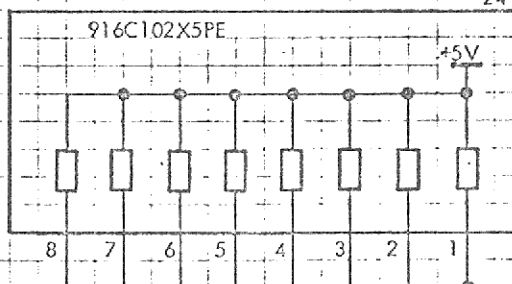
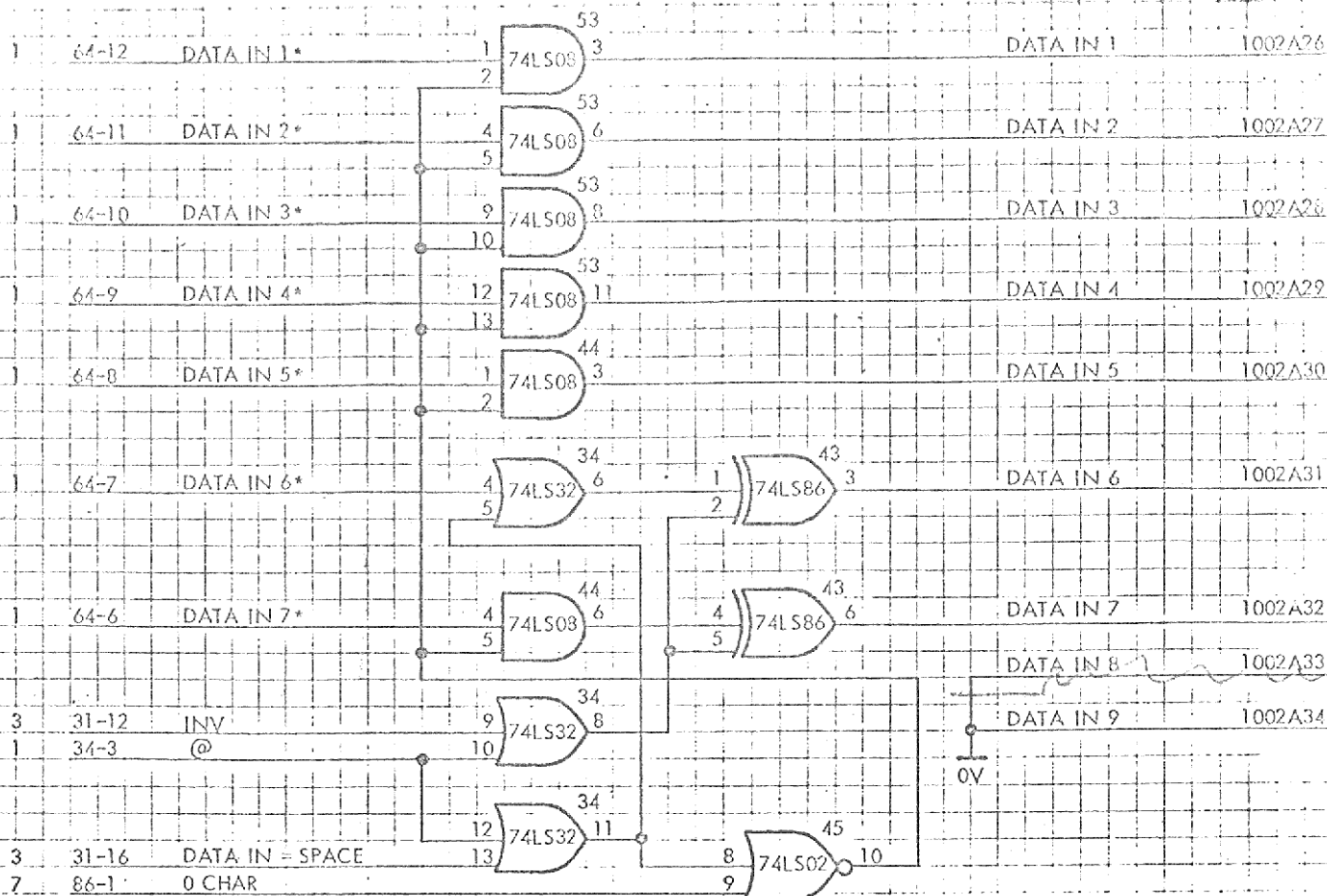
truth table

TABLE I. MM5307AA Output Details (821.6 kHz Master Clock Frequency)

CONTROL PINS A B C D	DIVISOR	OUTPUT FREQ kHz	COMMON BAUD RATES (OUTPUT FREQ/16)
0 0 0 1	1152	0.800	50
0 0 1 0	768	1.200	75
0 0 1 1	524	1.760	110
0 1 0 0	428.5	2.152	134.5
0 1 0 1	384	2.400	150
0 1 1 0	192	4.800	300
0 1 1 1	96	9.600	600
1 0 0 0	64	14.400	900
1 0 0 1	48	19.200	1200
1 0 1 0	32	28.800	1800
1 0 1 1	24	38.400	2400
1 1 0 0	16	57.600	3500
1 1 0 1	12	76.800	4800
1 1 1 0	8	115.200	7200
1 1 1 1	6	153.600	9600
0 0 0 0	-	EXT	-

timing diagram





Unit
DTI 100

Dwg. No.
A12931

INPUT CIRCUIT

Circuit Diagram

DTI 2
RC 2294
p2 of 9

4	11-5	COND	11	C0	A	4
4	12-9	JUMP A1	14	D0	B	7
4	12-7	JUMP A2	3	A1	C	9
4	12-6	JUMP A3	6	B1	D	12
4	1-12	JUMP COND	10	C1		
			13	D1		

3	32-9	JUMP	1	15	0V
---	------	------	---	----	----

7	76-12	HOME
---	-------	------

7	14-6	RES
---	------	-----

4	24-9	1 GEN A
---	------	---------

7	36-2	RES
---	------	-----

1002A5	PRESET ENABLE
46-15	INIT

74LS157

2	A0
5	B0
11	C0
14	D0
3	A1
6	B1
10	C1
13	D1

7406

74S288

14	A0
13	A1
12	A2
11	A3
10	A4
15	E

74S288

14	A0
13	A1
12	A2
11	A3
10	A4
15	E

74S288

14	A0
13	A1
12	A2
11	A3
10	A4
15	E

74LS273

3	a
4	b
7	c
8	d
13	e
14	f
17	g
18	h
11	T
1	R

74LS273

3	a
4	b
7	c
8	d
13	e
14	f
17	g
18	h
11	T
1	R

74LS273

3	a
4	b
7	c
8	d
13	e
14	f
17	g
18	h
11	T
1	R

Y 0
Y 1
Y 2
Y 3
Y 4

12	ROM ADD 4
15	CURSOR BLOCK
16	BLOCK
19	BELL

2	COND SEL 0
5	COND SEL 1
6	COND SEL 2
9	JUMP
12	CHAR CUR 2
15	CHAR CUR 1
16	CHAR CUR 0
19	LINE CUR 2

2	LINE CUR 1
5	LINE CUR 0
6	SAVE CURSOR
9	SEL SOURCE
12	INV
15	EXTERNAL REQ 1
16	DATA IN = SPACE
19	RDAR

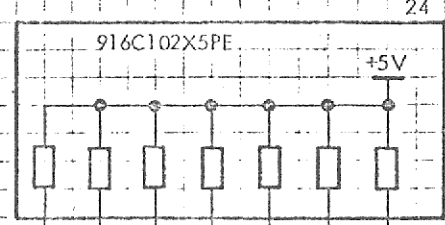
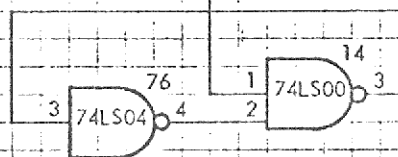
3 33-12 ROM ADD 4
 7 1002B3 - RETURN
 7 46-2 CHAR RDY *
 7 46-5 COMMAND CHAR *
 1002B43 FIRST CHAR
 1002B42 LAST CHAR
 1002B41 FIRST LINE
 1002B40 LAST LINE

3 32-2 COND SEL 0
 3 32-5 COND SEL 1
 3 32-6 COND SEL 2

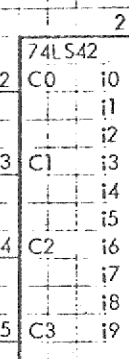
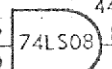
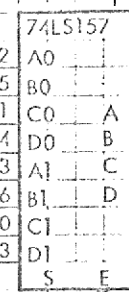
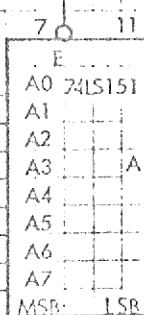
2 44-3 DATA IN 5 14
 2 53-11 DATA IN 4 13
 2 53-8 DATA IN 3 12
 2 53-6 DATA IN 2 11
 2 53-3 DATA IN 1 10

4 11-5 COND

3 32-9 JUMP



8 124-11 - KB STROBE
 9 135-6 FULL DUPLEX
 7 35-12 COMMAND CHAR



JUMP A 3
 JUMP A 2
 JUMP A 1

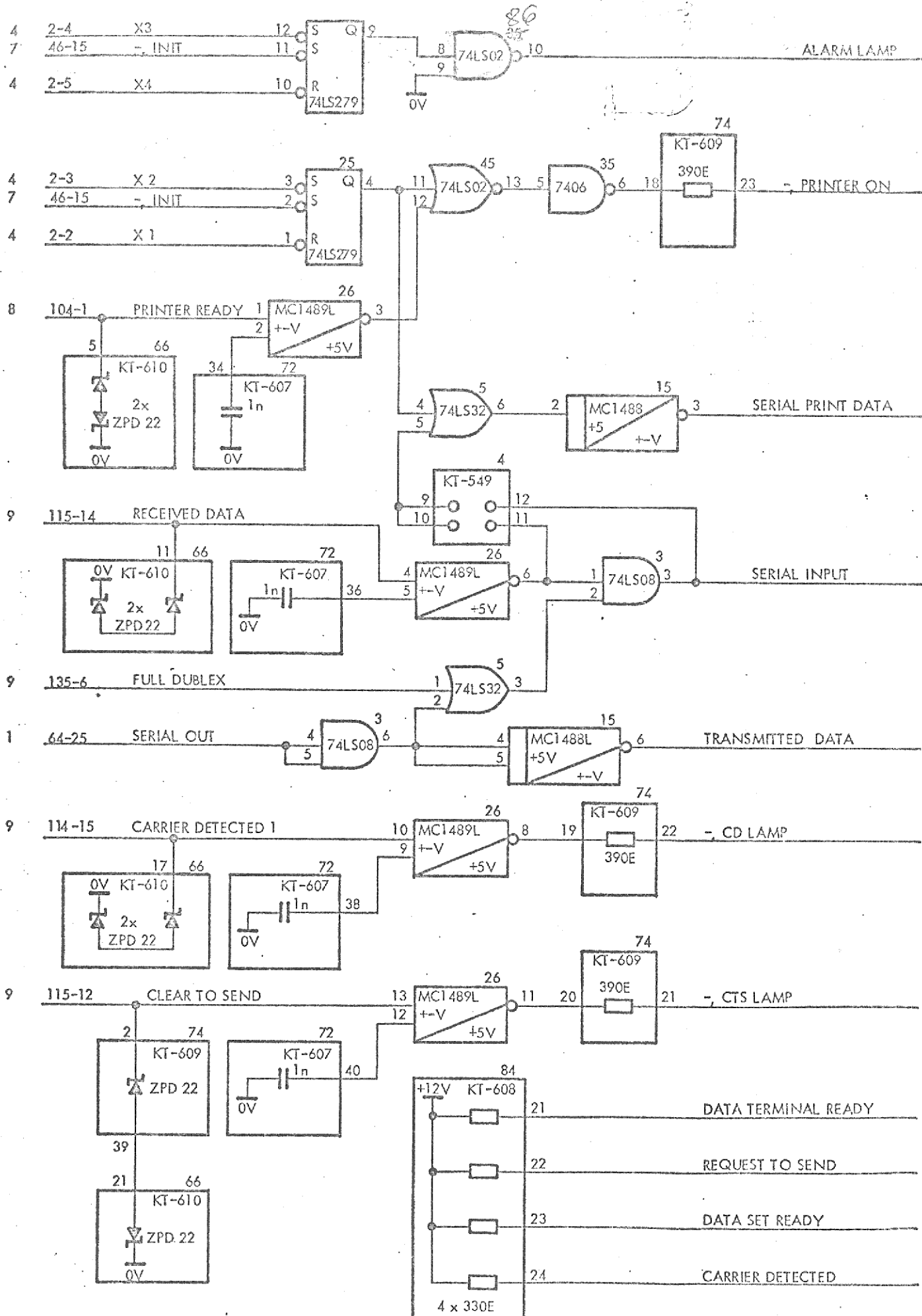
1 GEN A
 1 GEN B
 1 GEN C
 Z

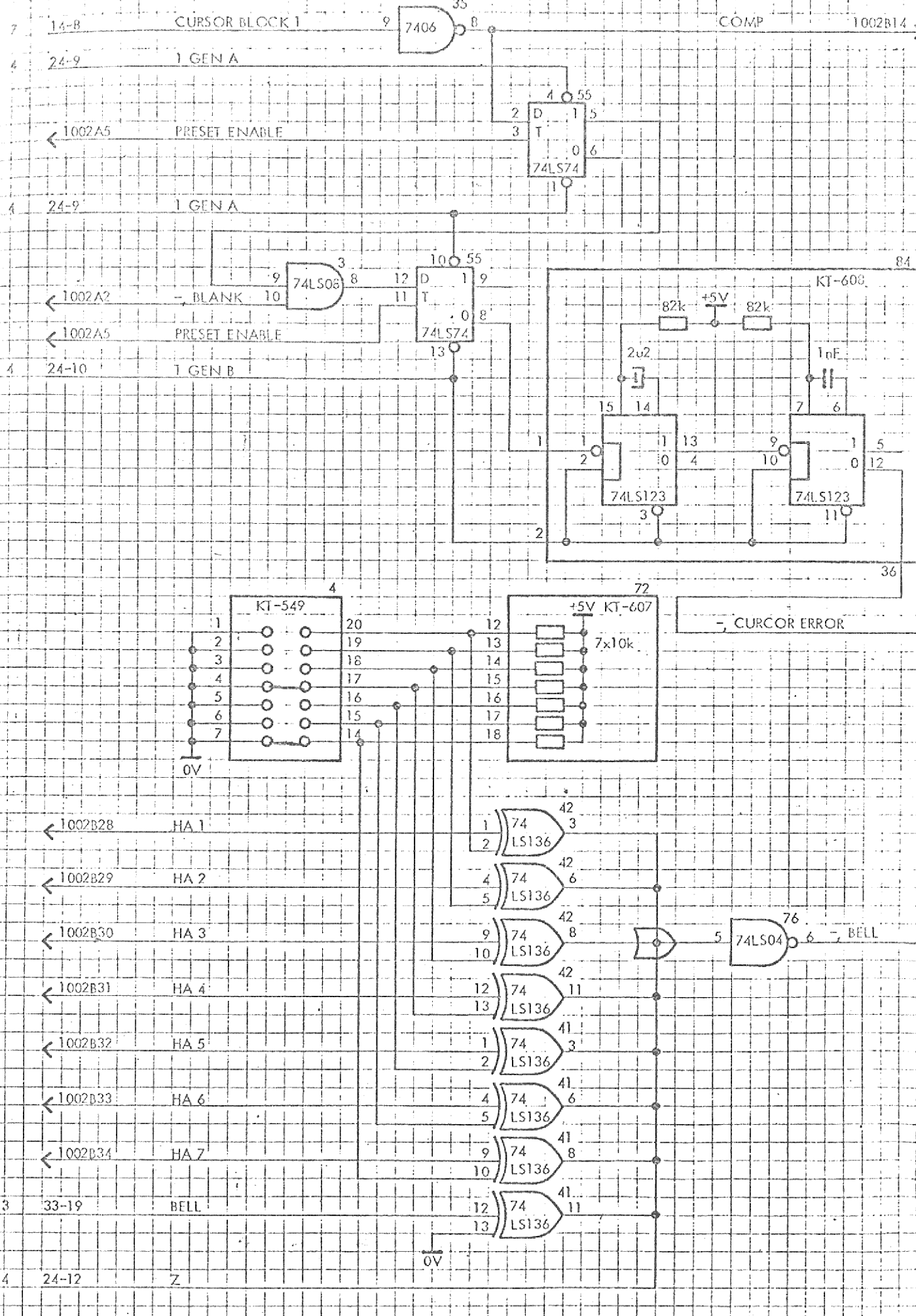
Unit
 DTI 100
 Dwg. No.
 A12929

CONDITION AND JUMP SELECTION

Circuit Diagram

DTI 4
 RC 2294
 p 4 of 9

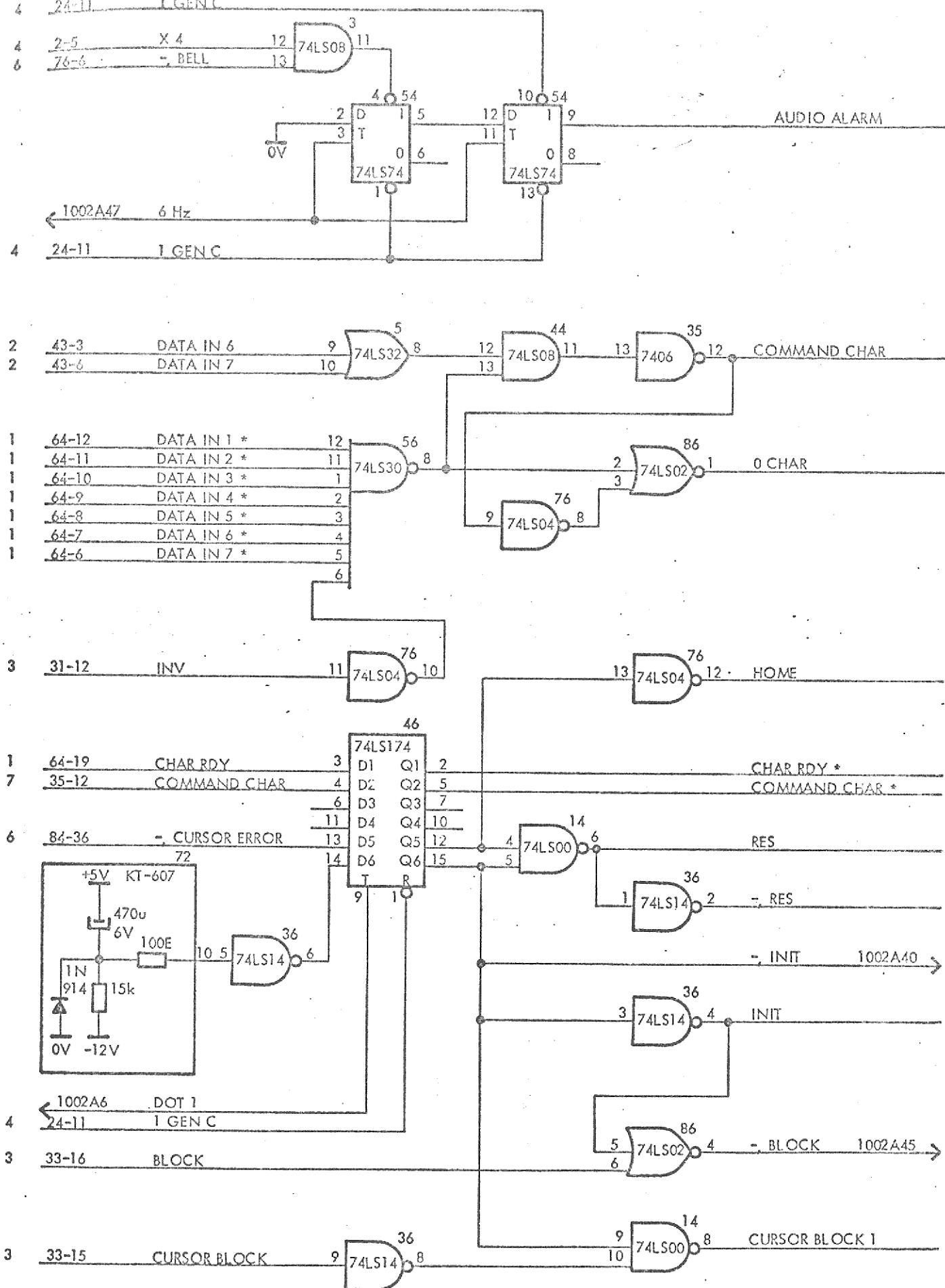




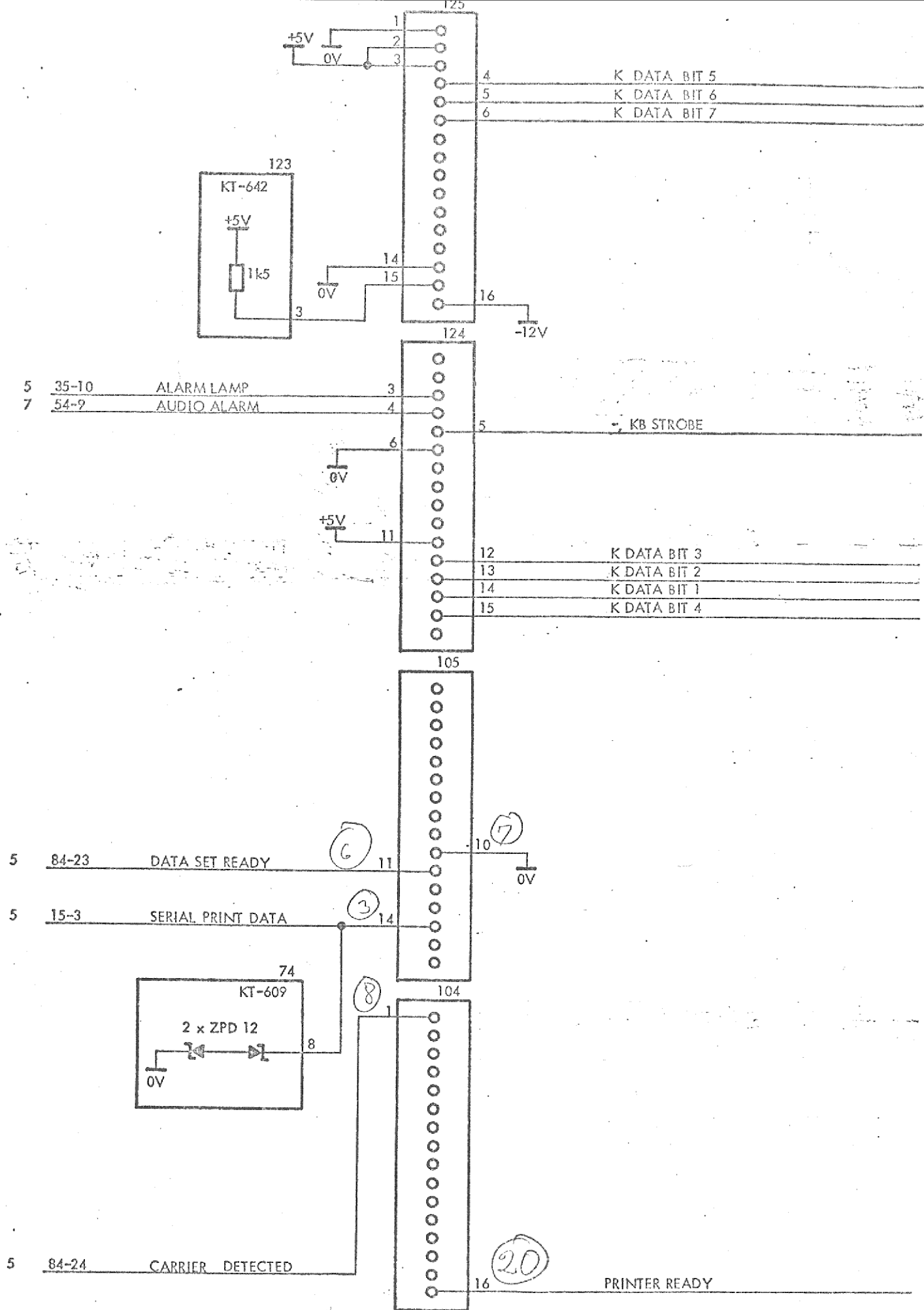
A/S REC. CENTRALEN
 DTI 100
 Dwg. No. A12932
 DTI 6
 RC 2294
 p 6 of 9

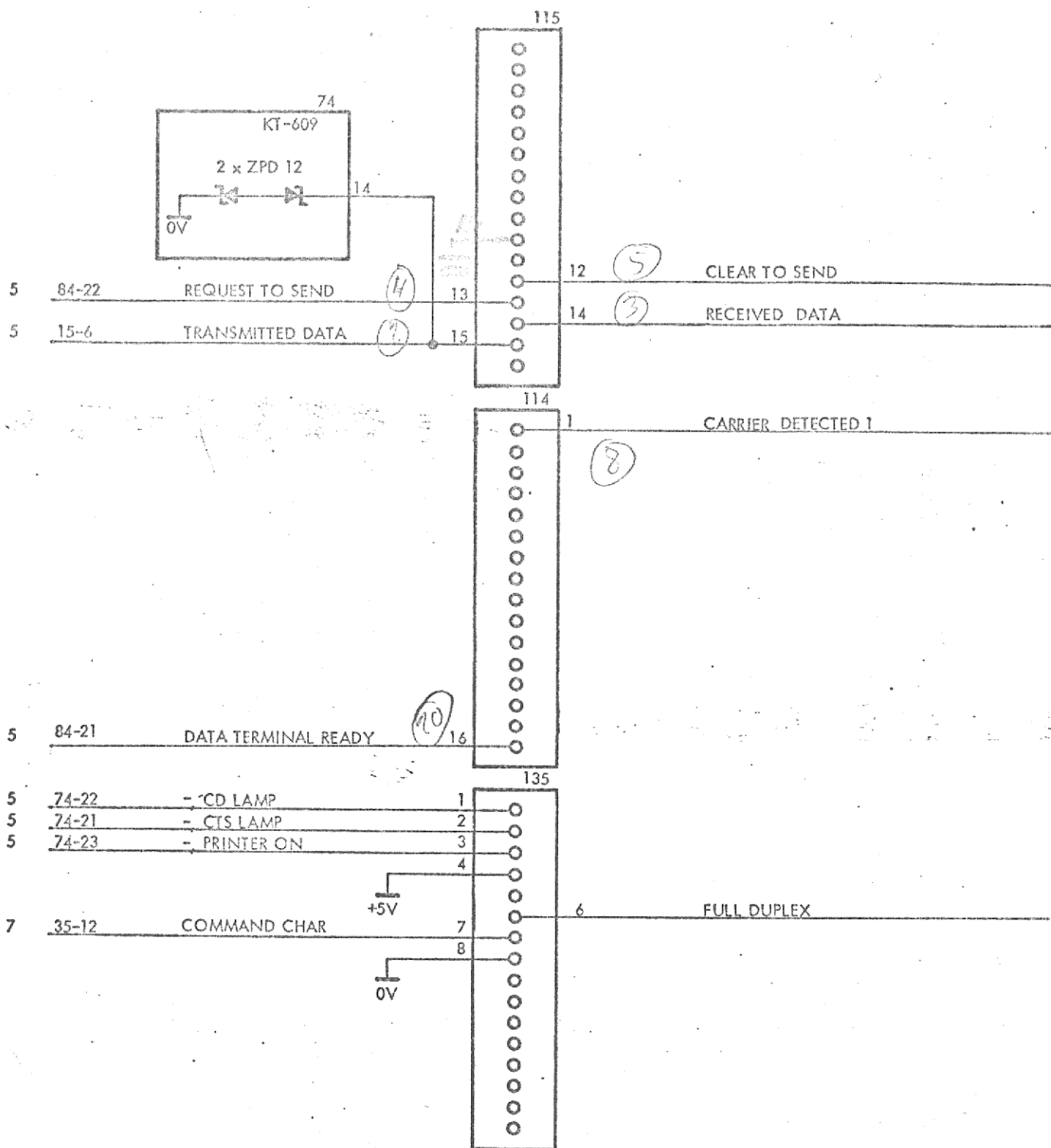
CURSOR SUPER VISION AND BELL

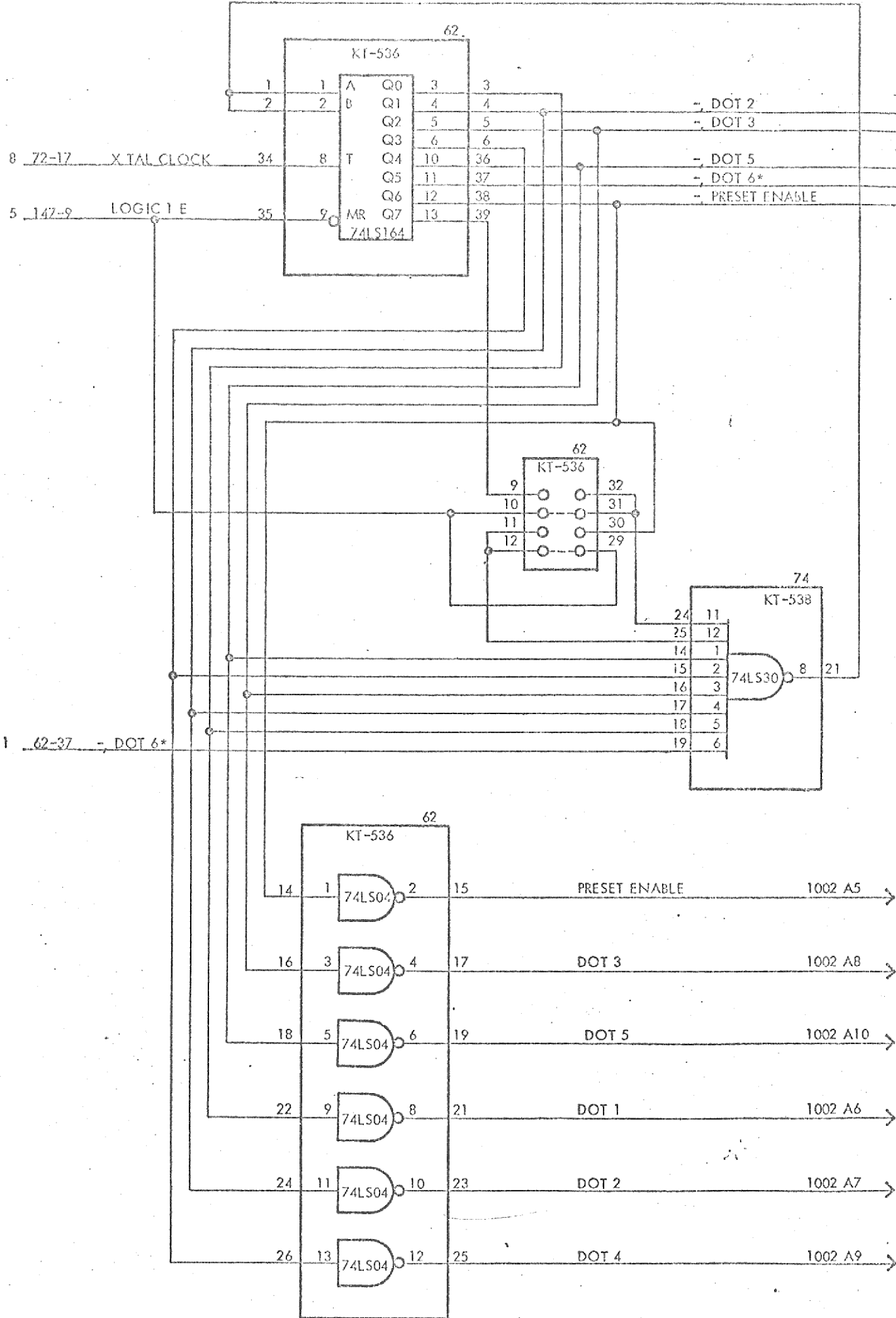
Circuit Diagram



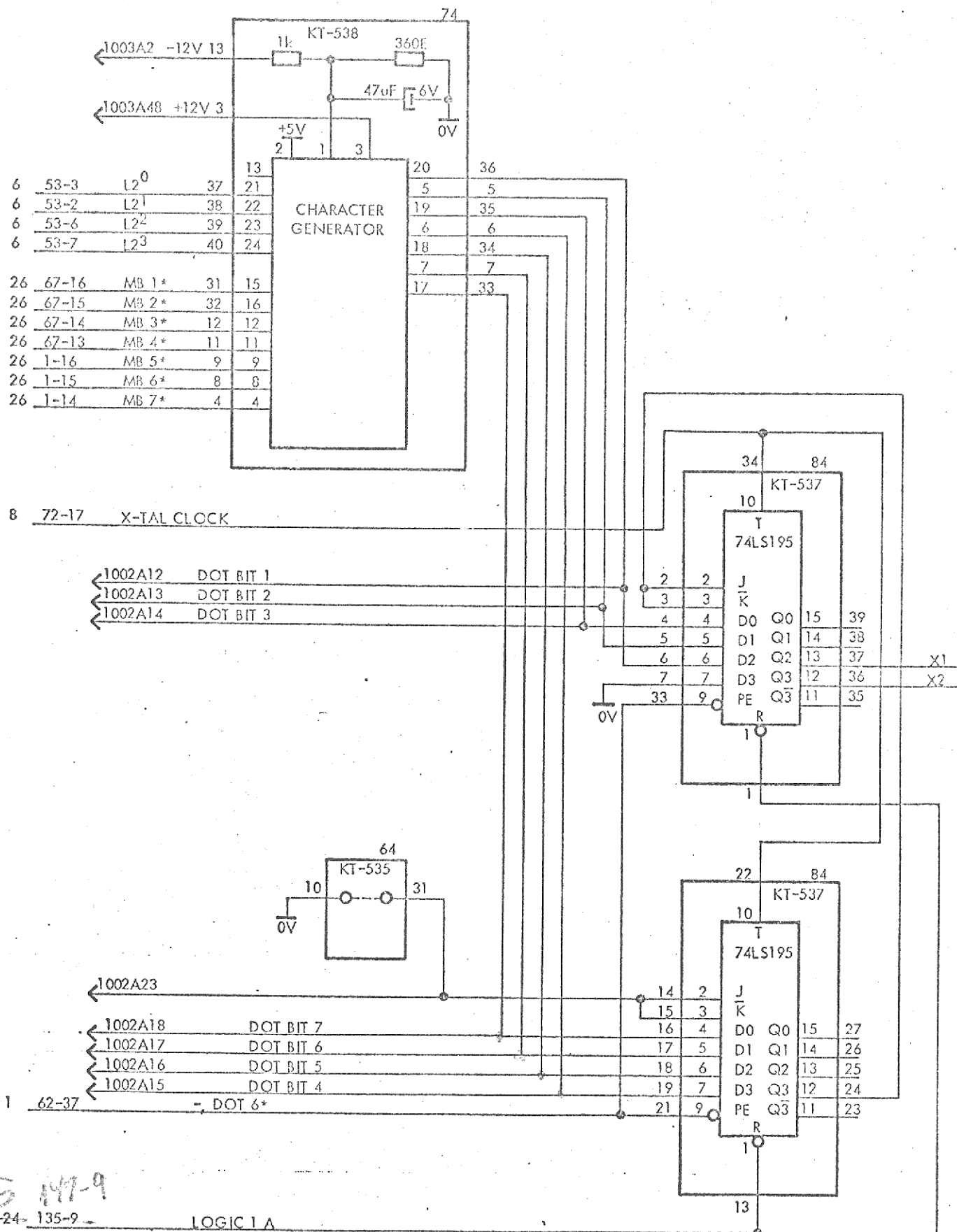
770708 KØN 771104 IGH 770726 LLM

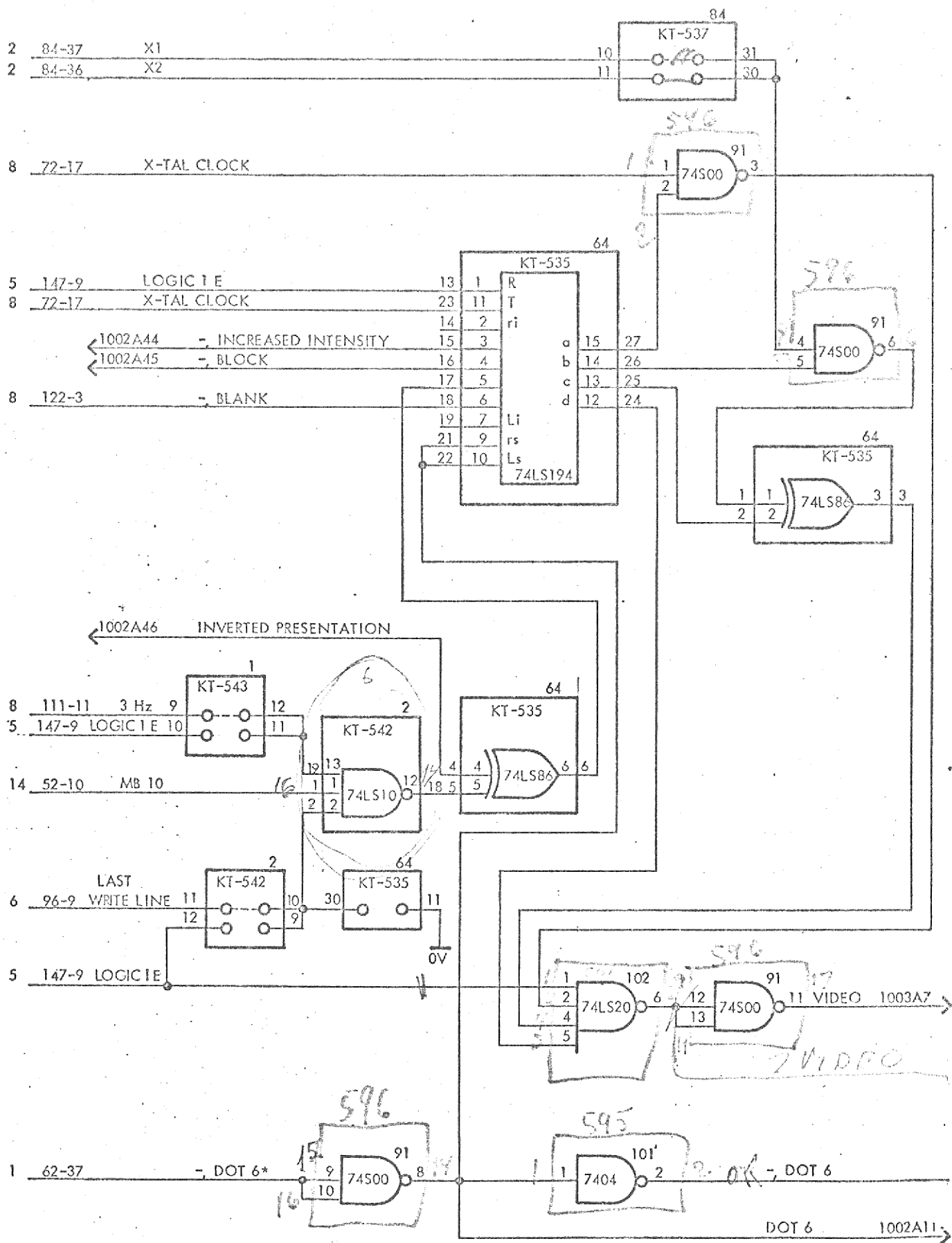




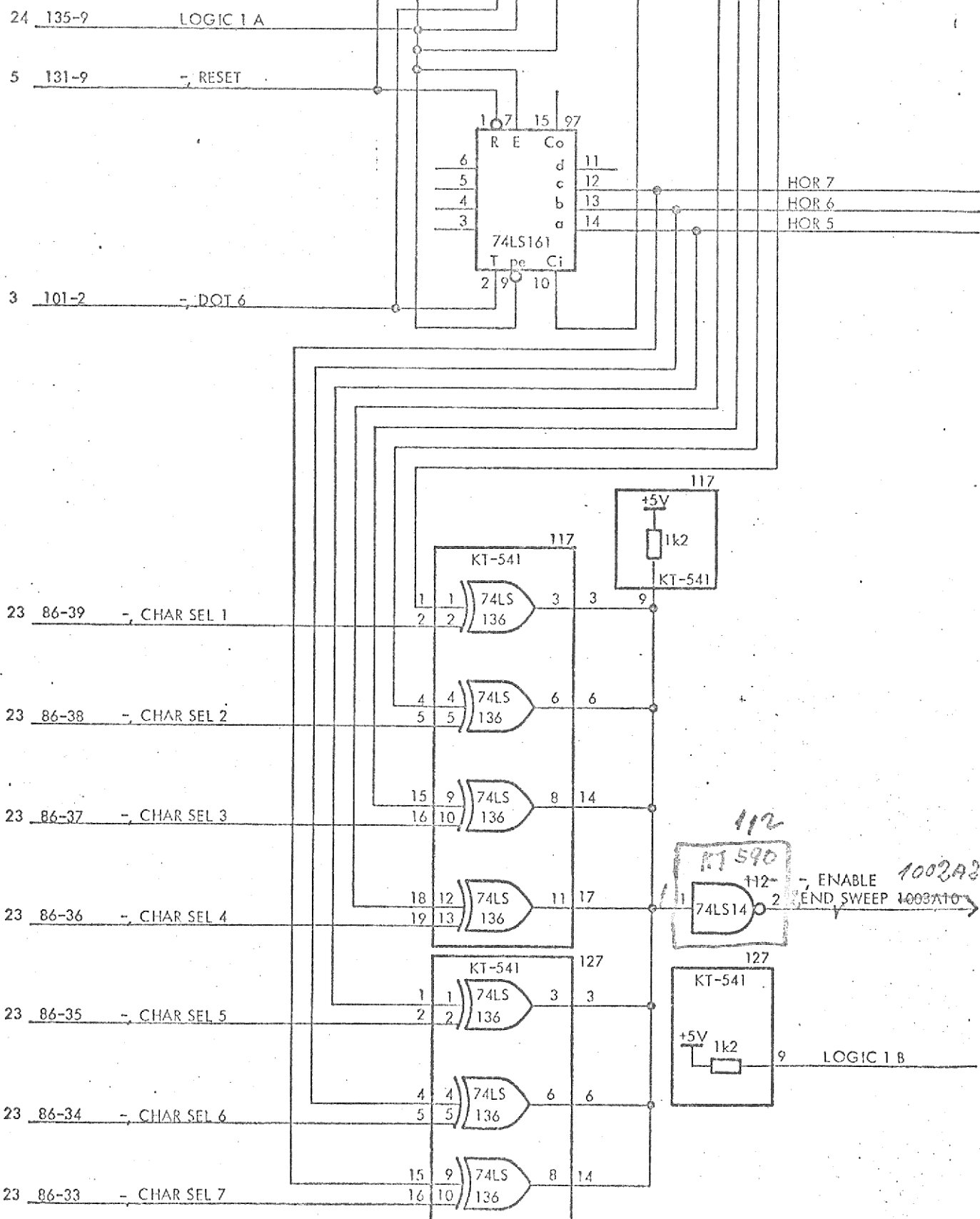


DOT - COUNTER
 DISPLAY TIMING
 Circuit Diagram





760323 KON 760909 IGH



760223 KQ N 760909 IGH

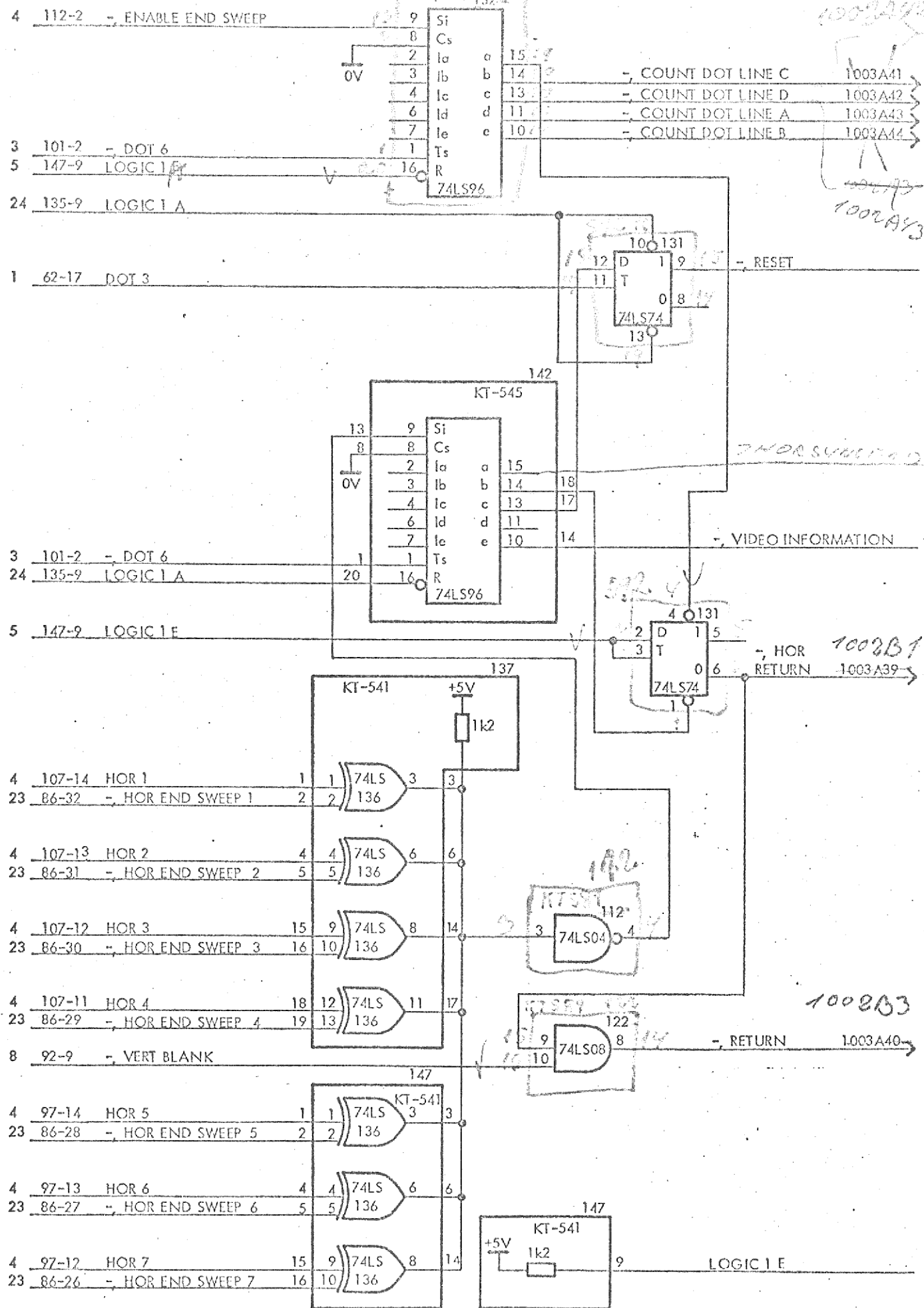
SML 100

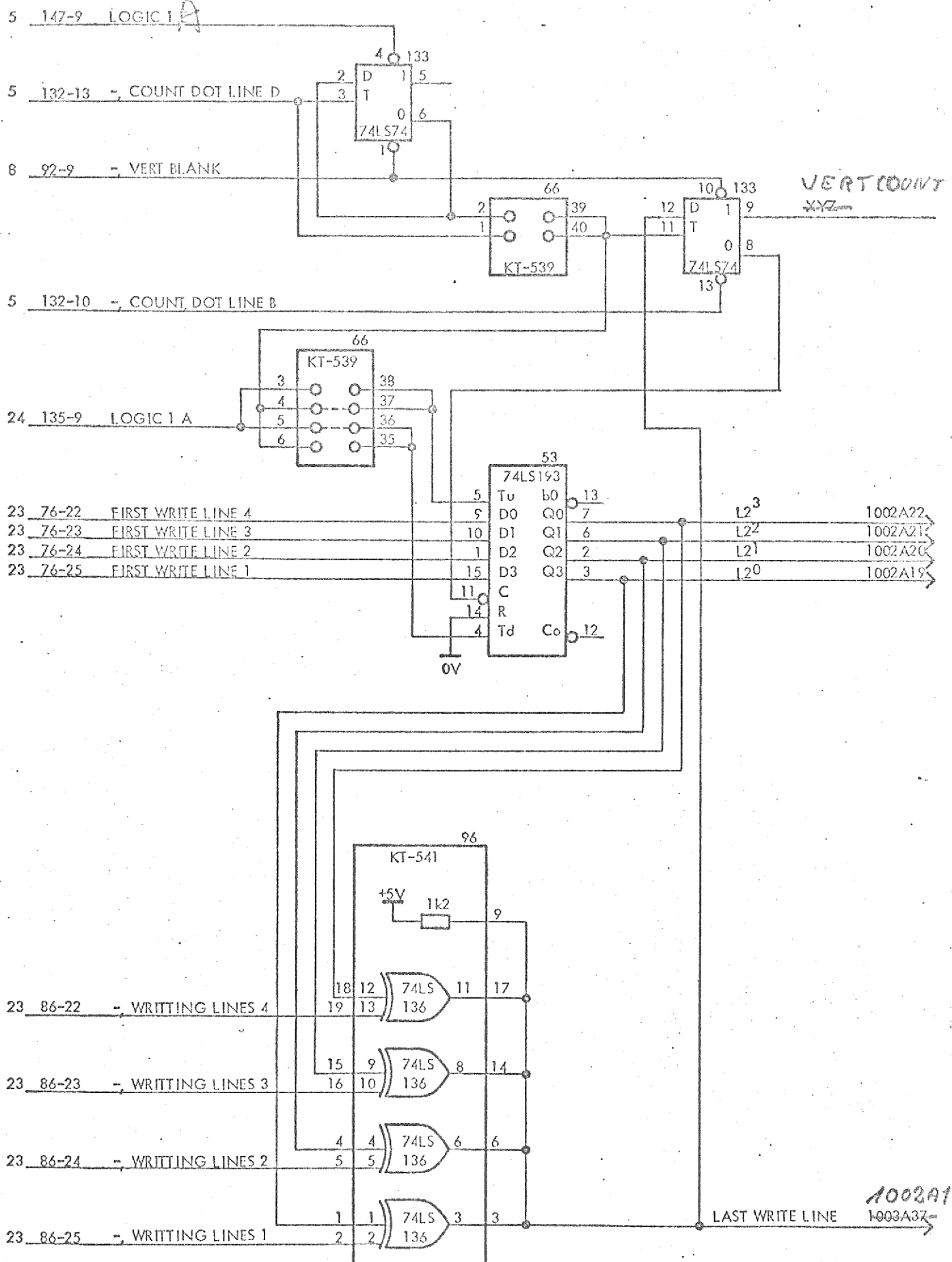
A12484

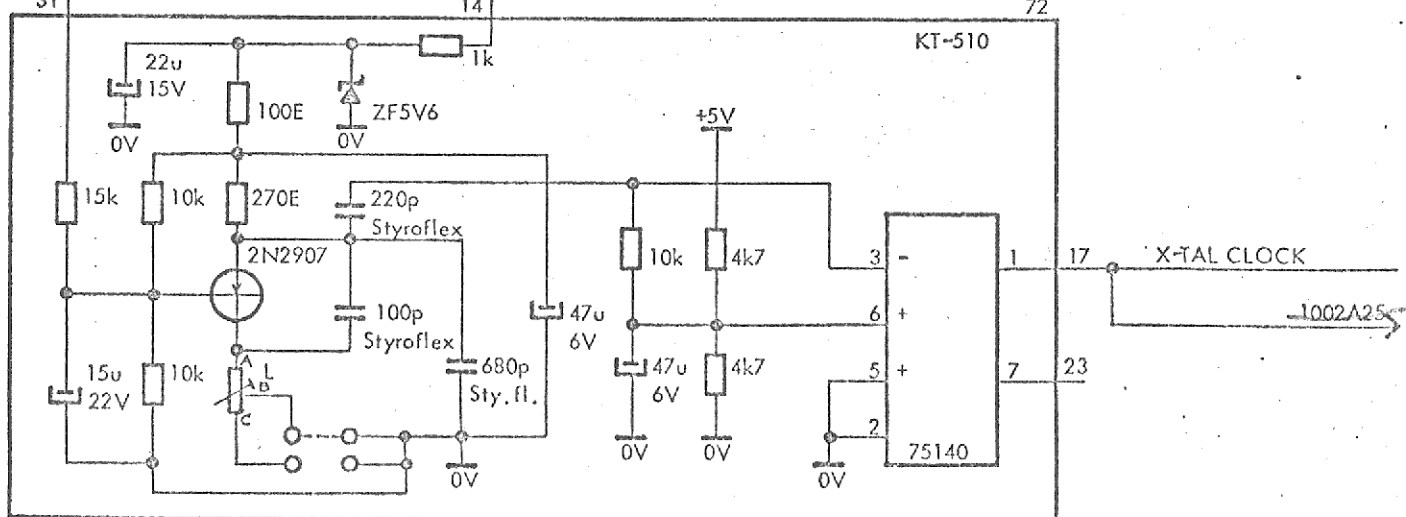
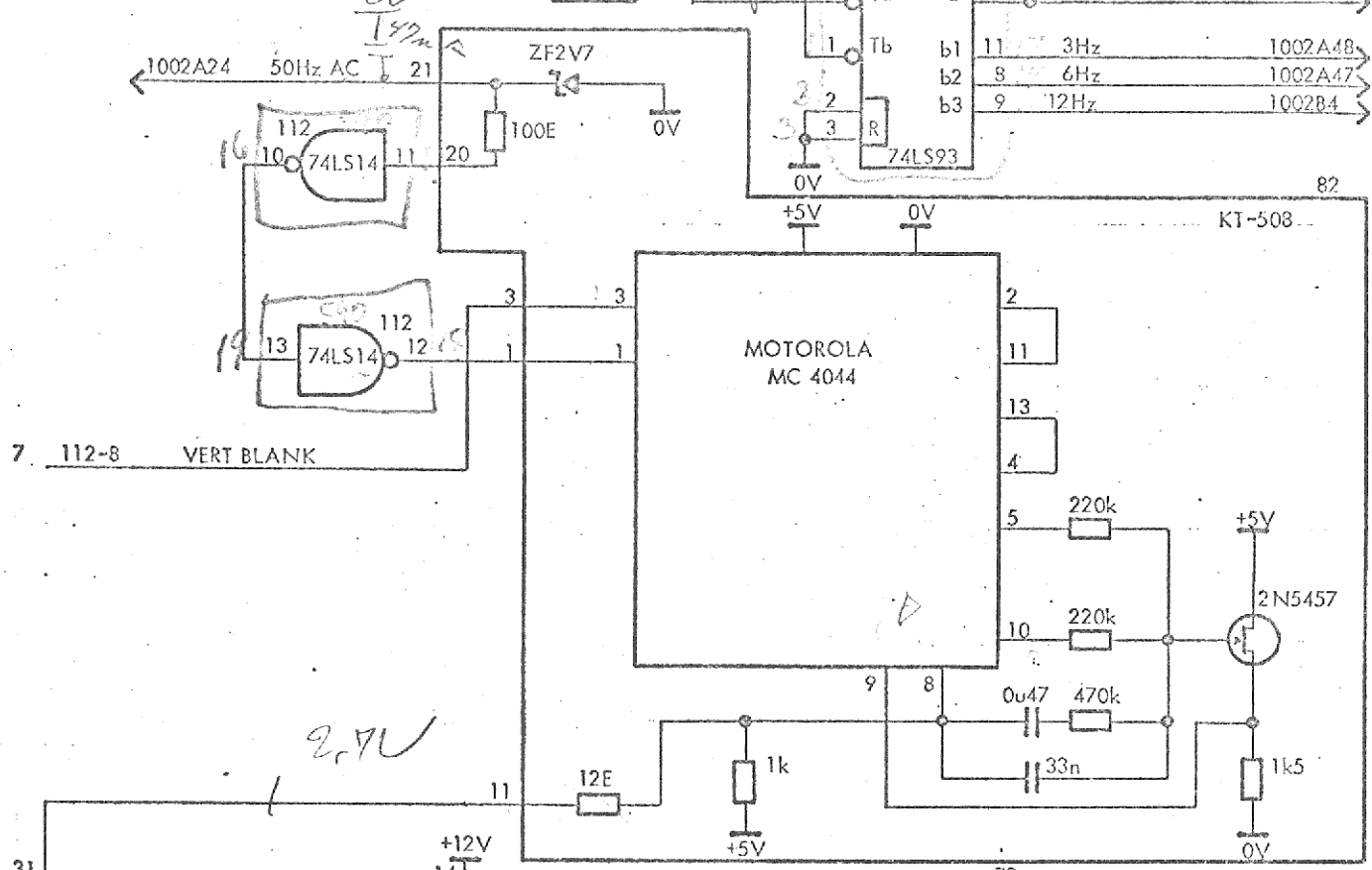
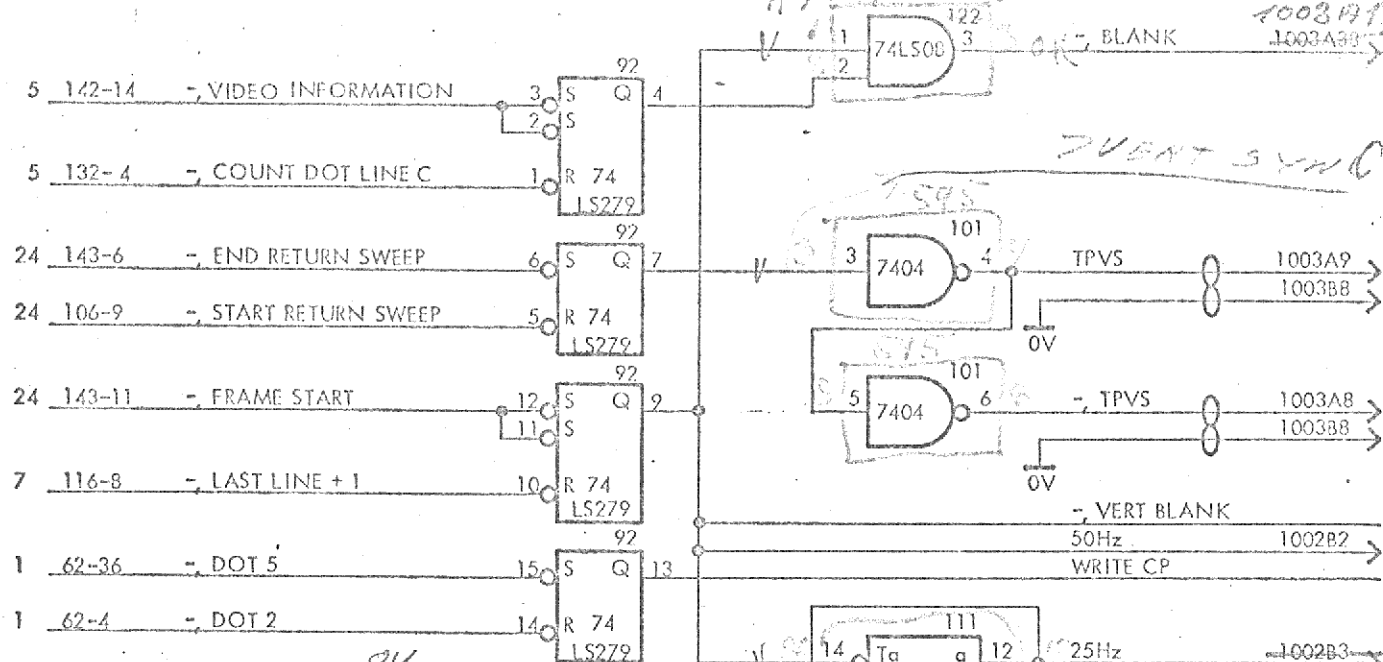
CHARACTER COUNTER
DISPLAY TIMING
Circuit Diagram

SML 4

p 4 of 26





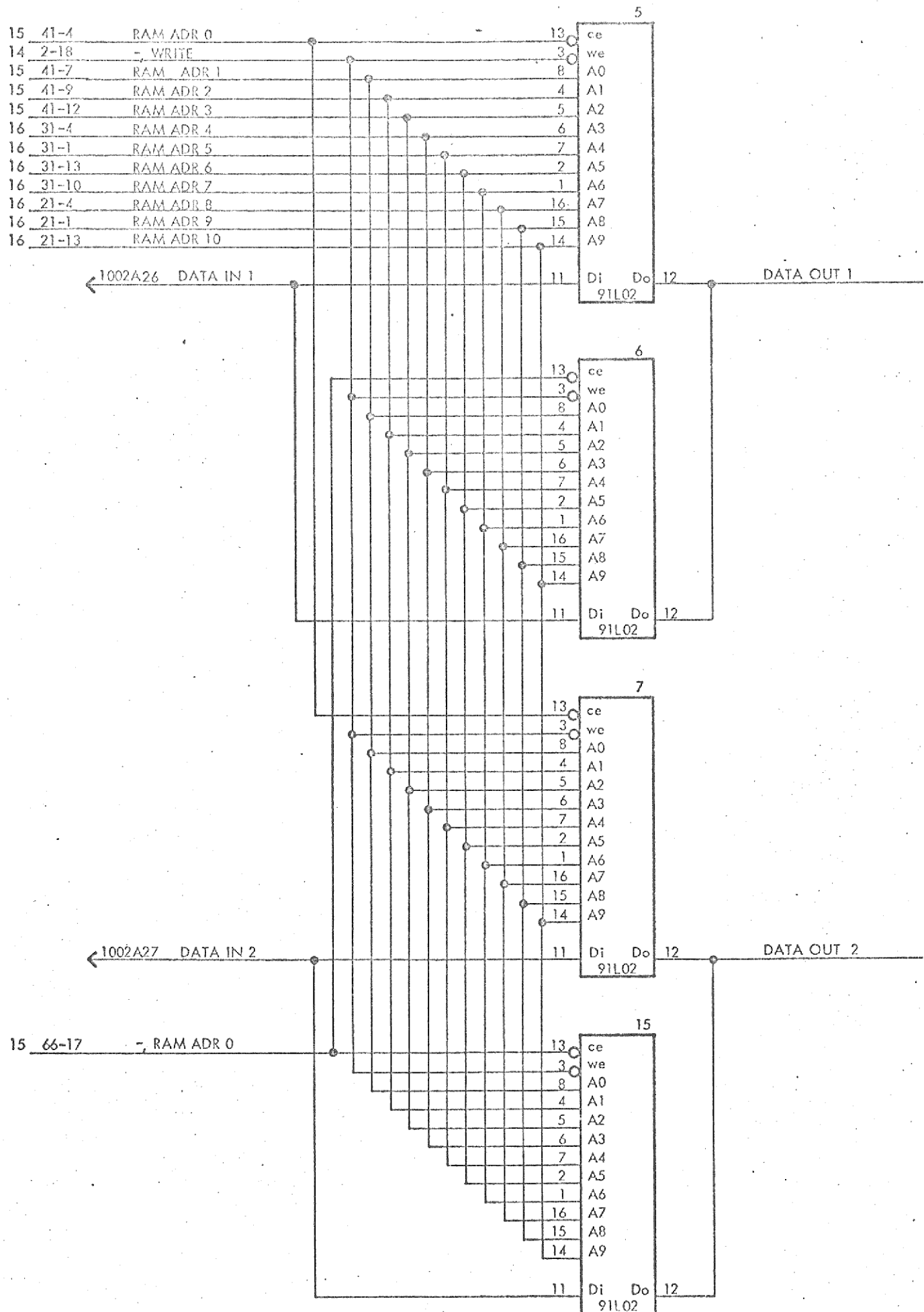


SML 100

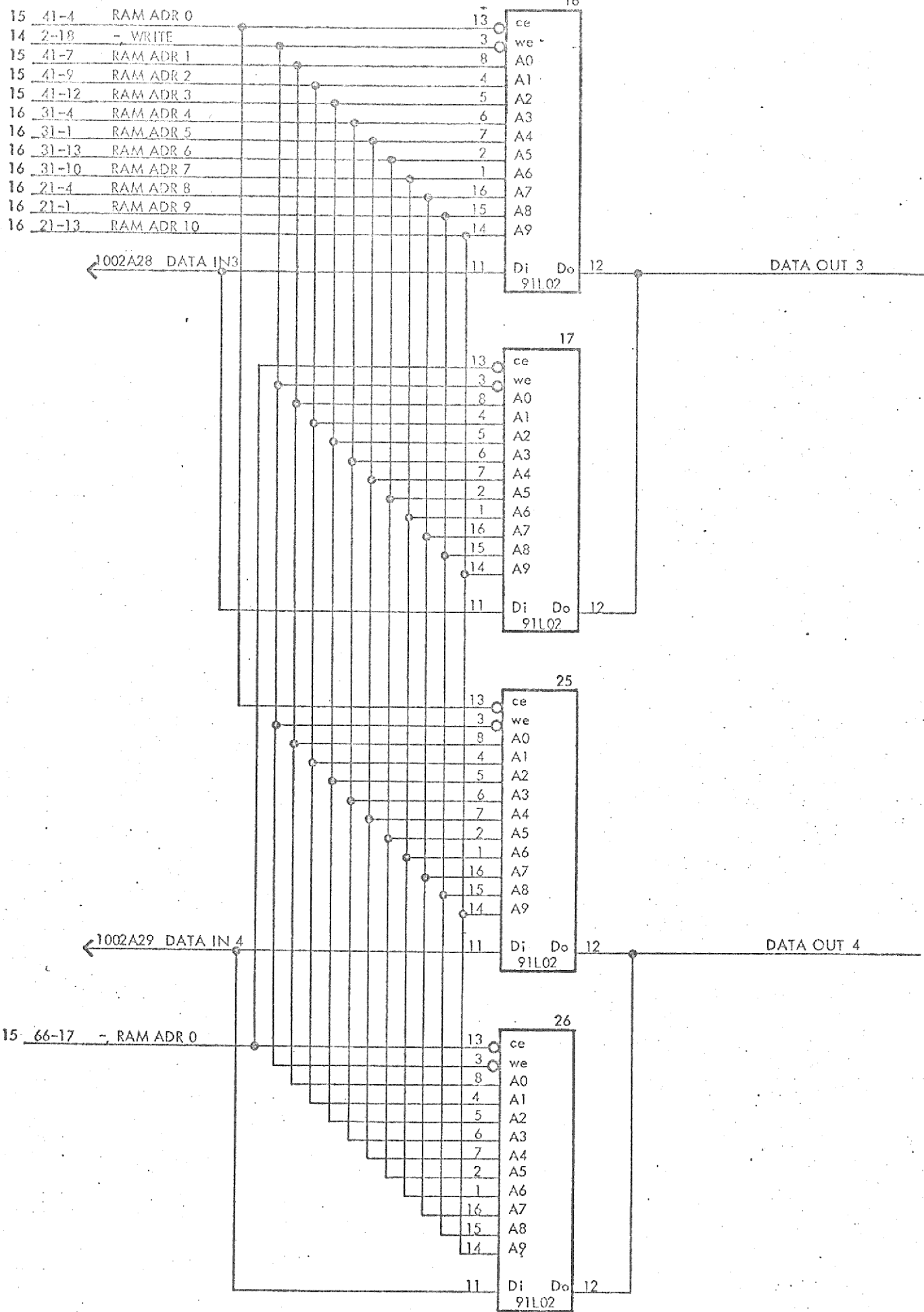
A12487

PHASE - LOCKED LOOP OSC
DISPLAY TIMING
Circuit Diagram

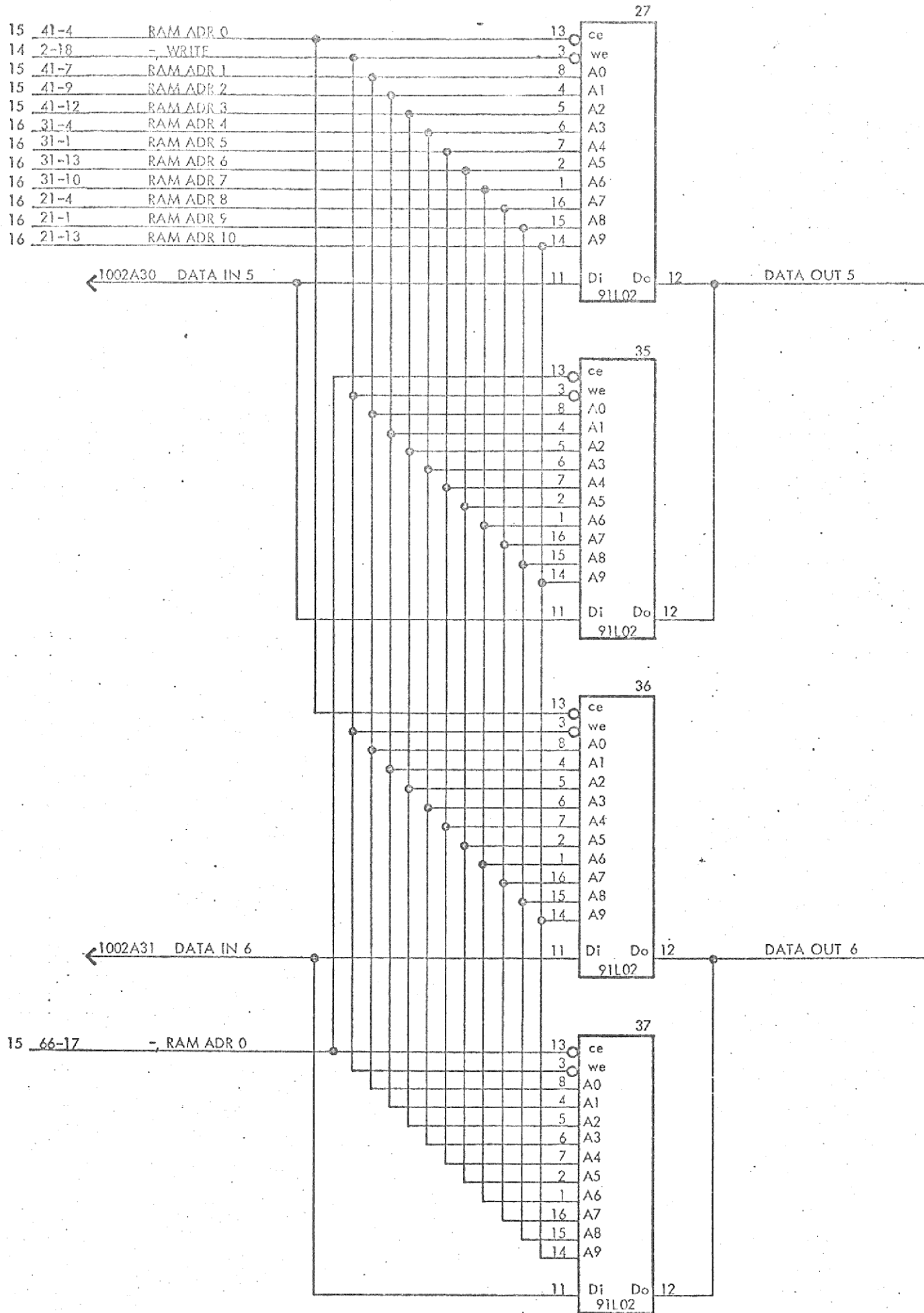
SML 8



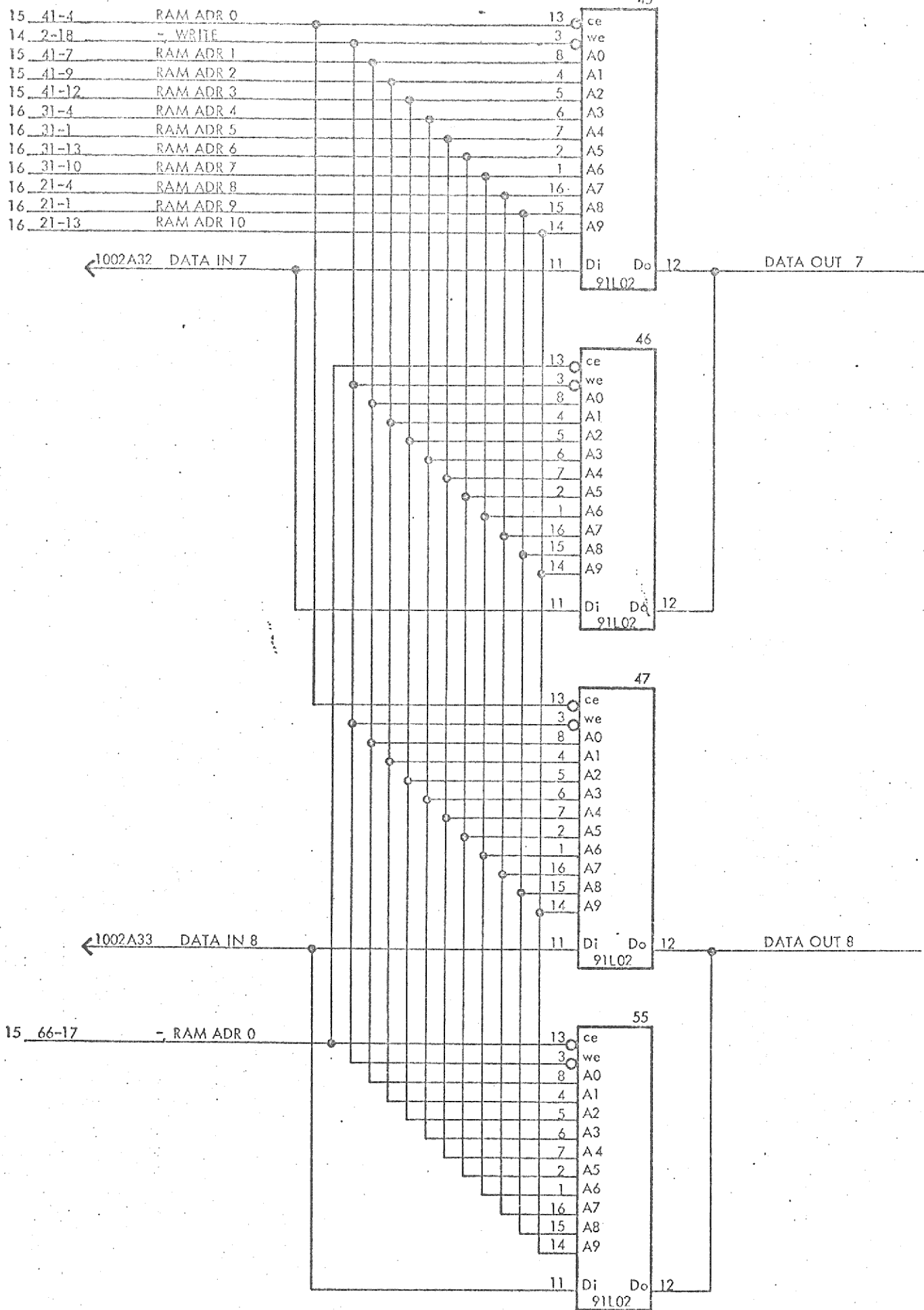
760223 KØN 760907 IGH



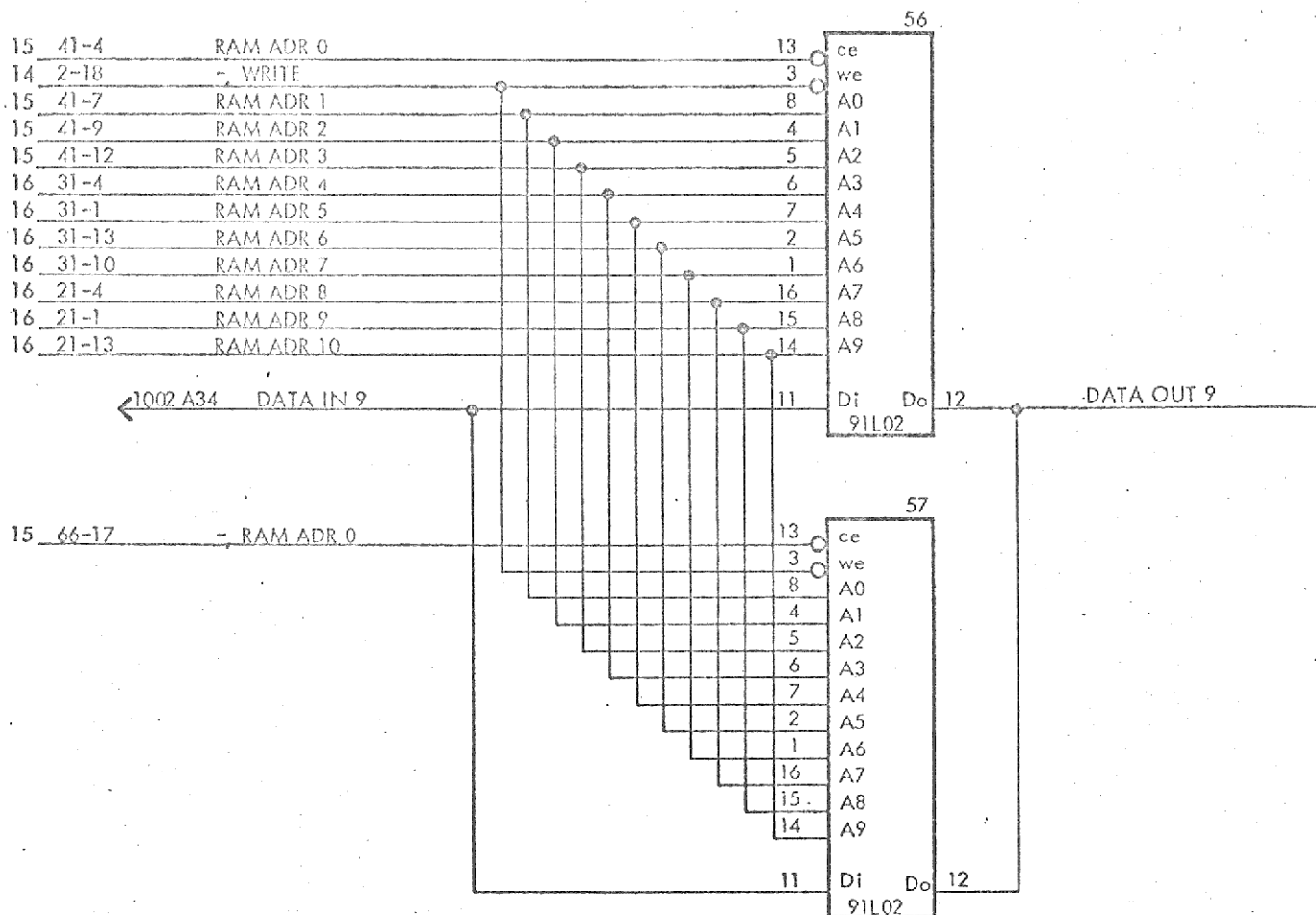
760223 K0N 760907 IGH



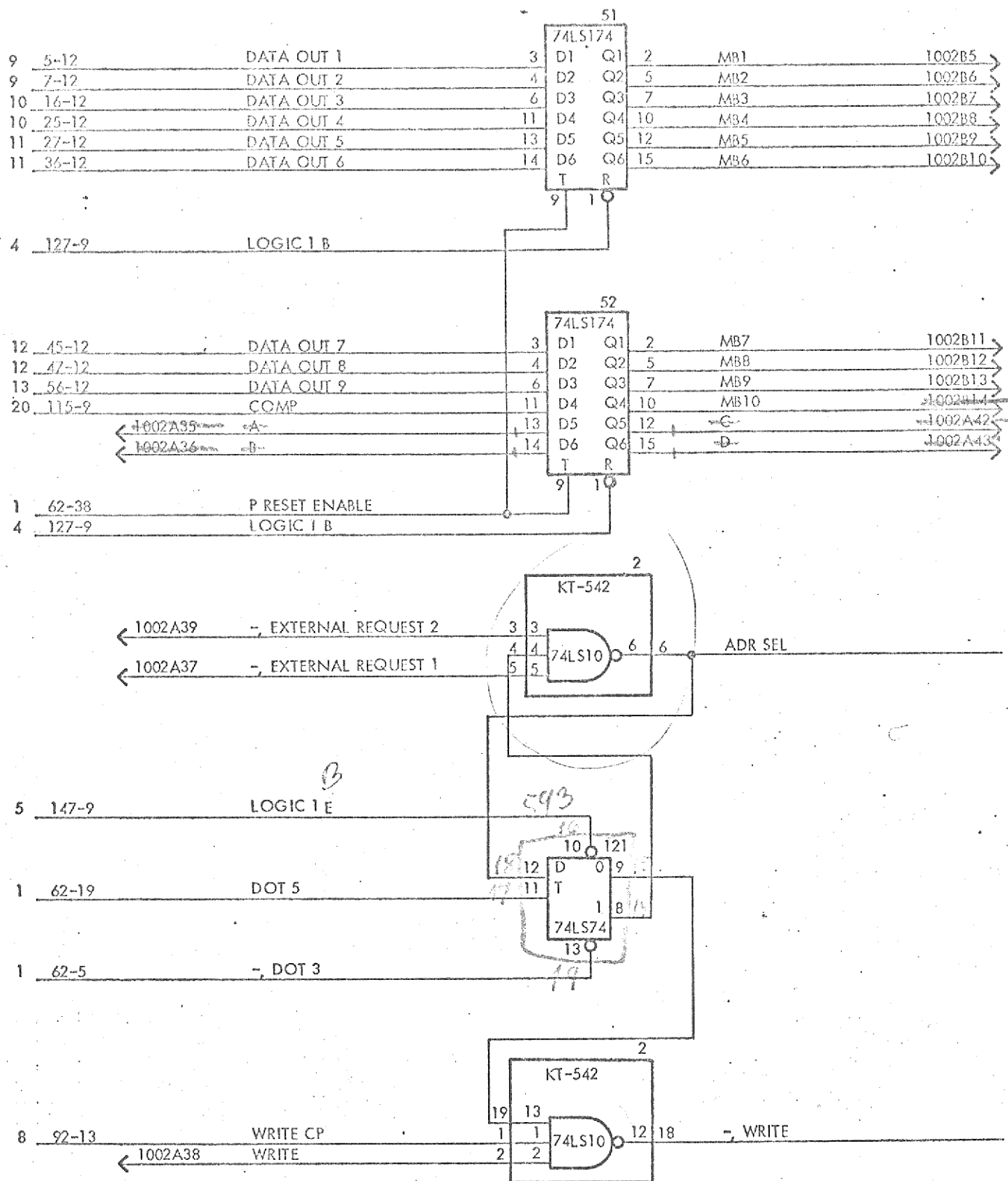
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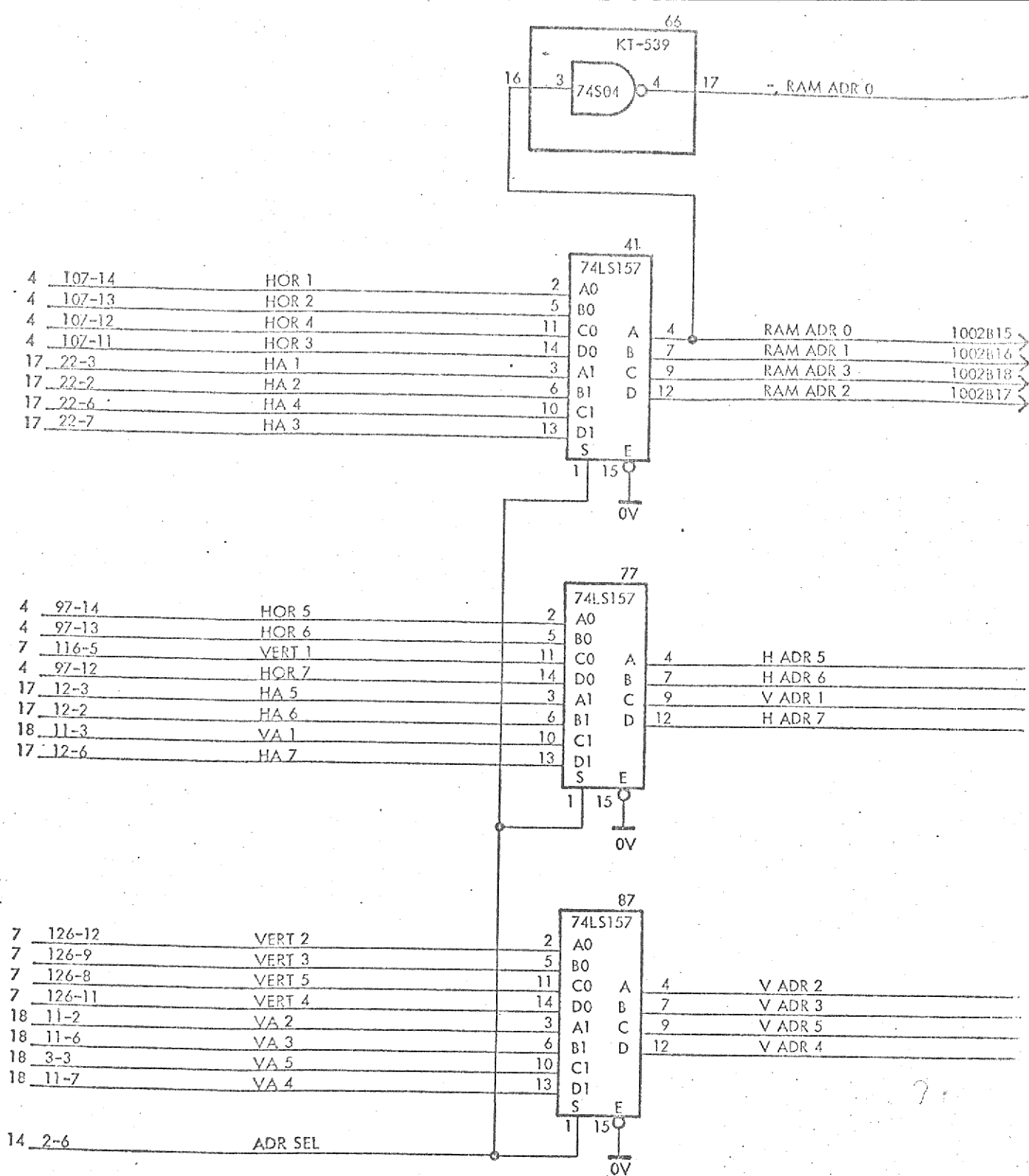


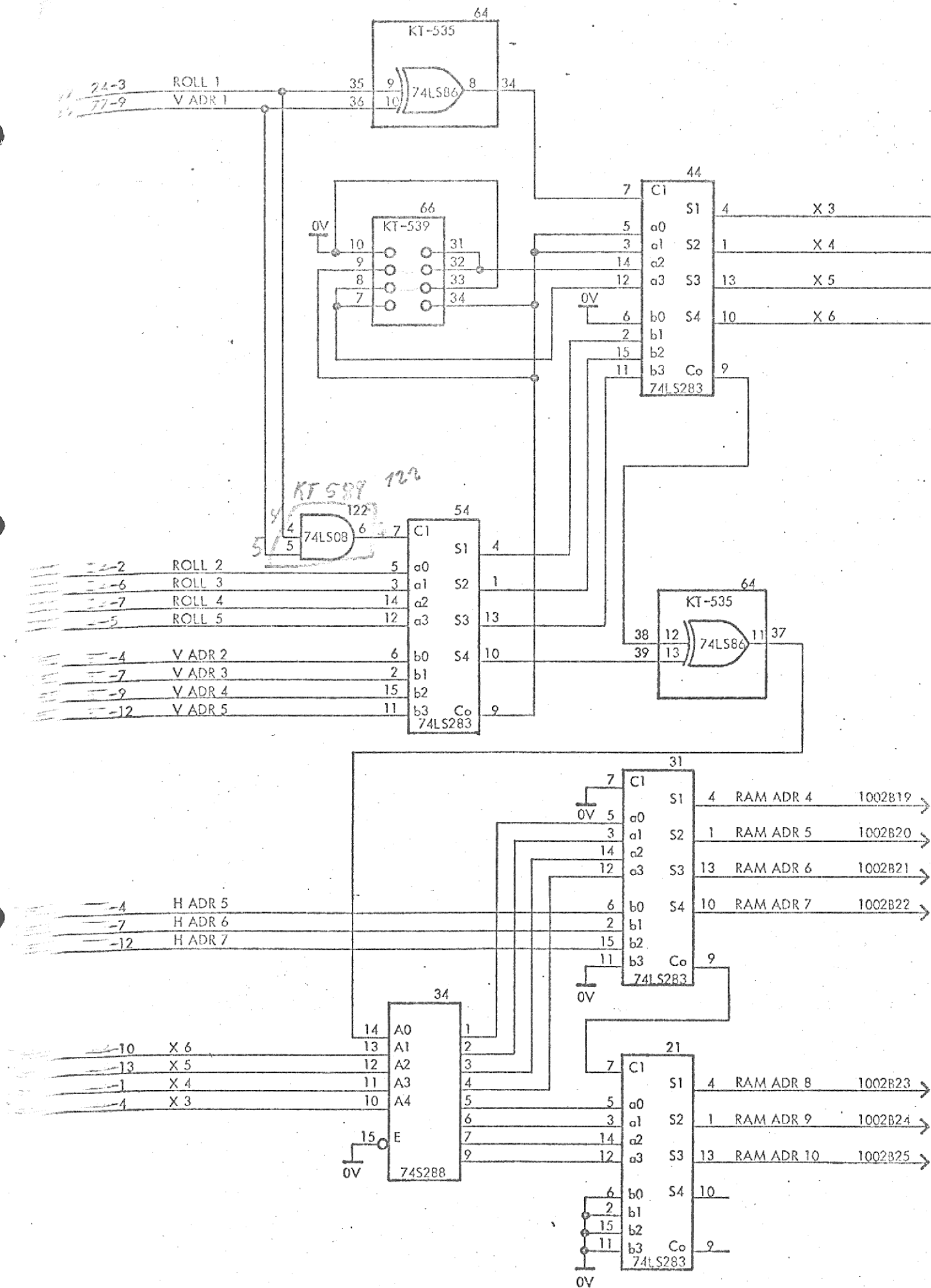
760223 KPN 760907 IGH



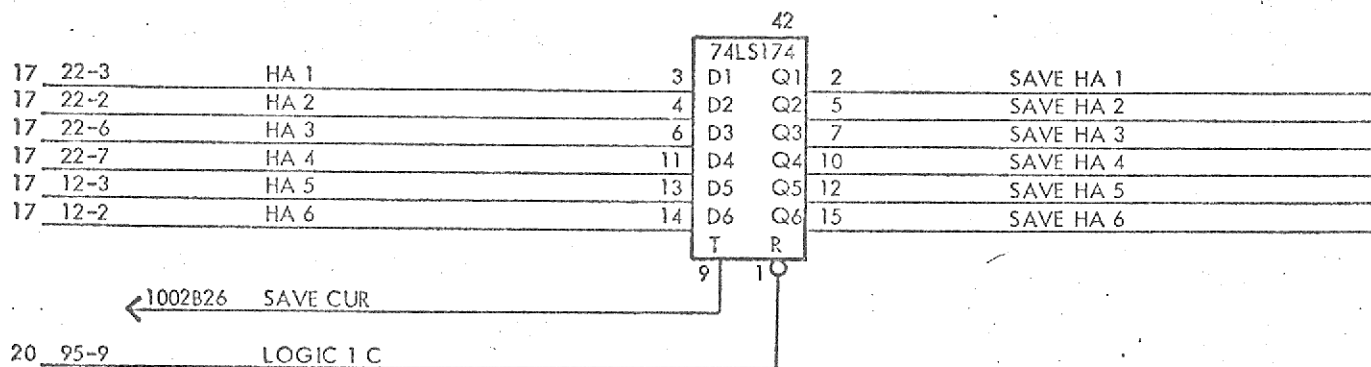
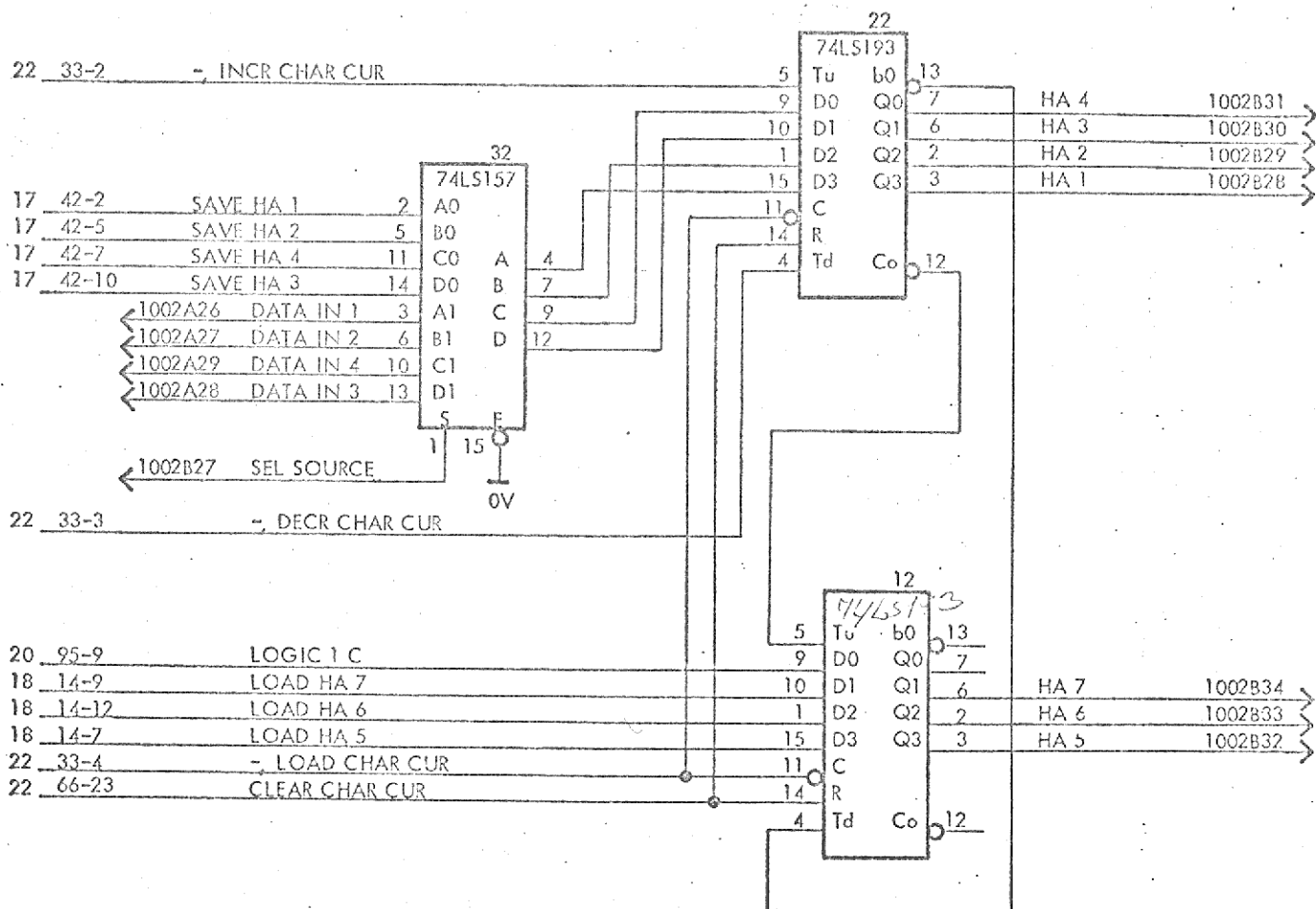
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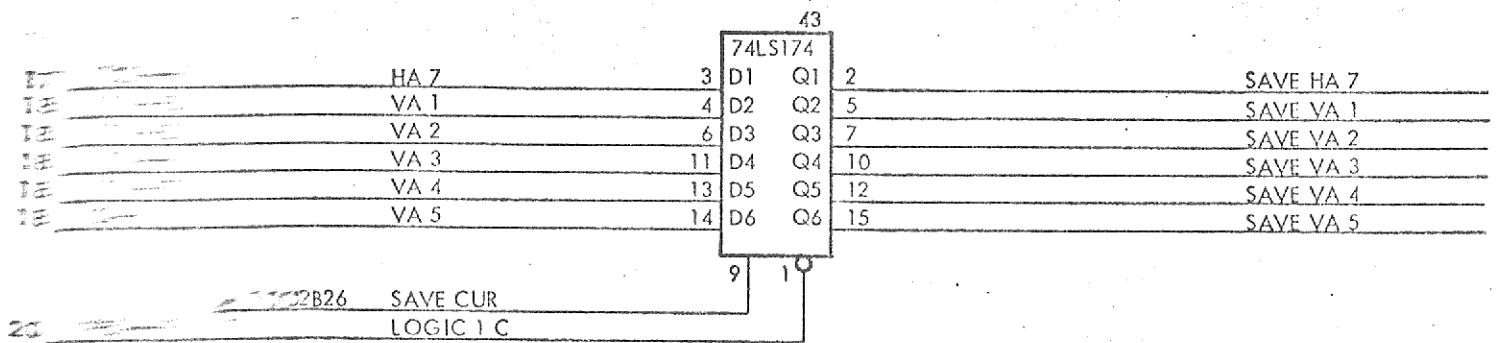
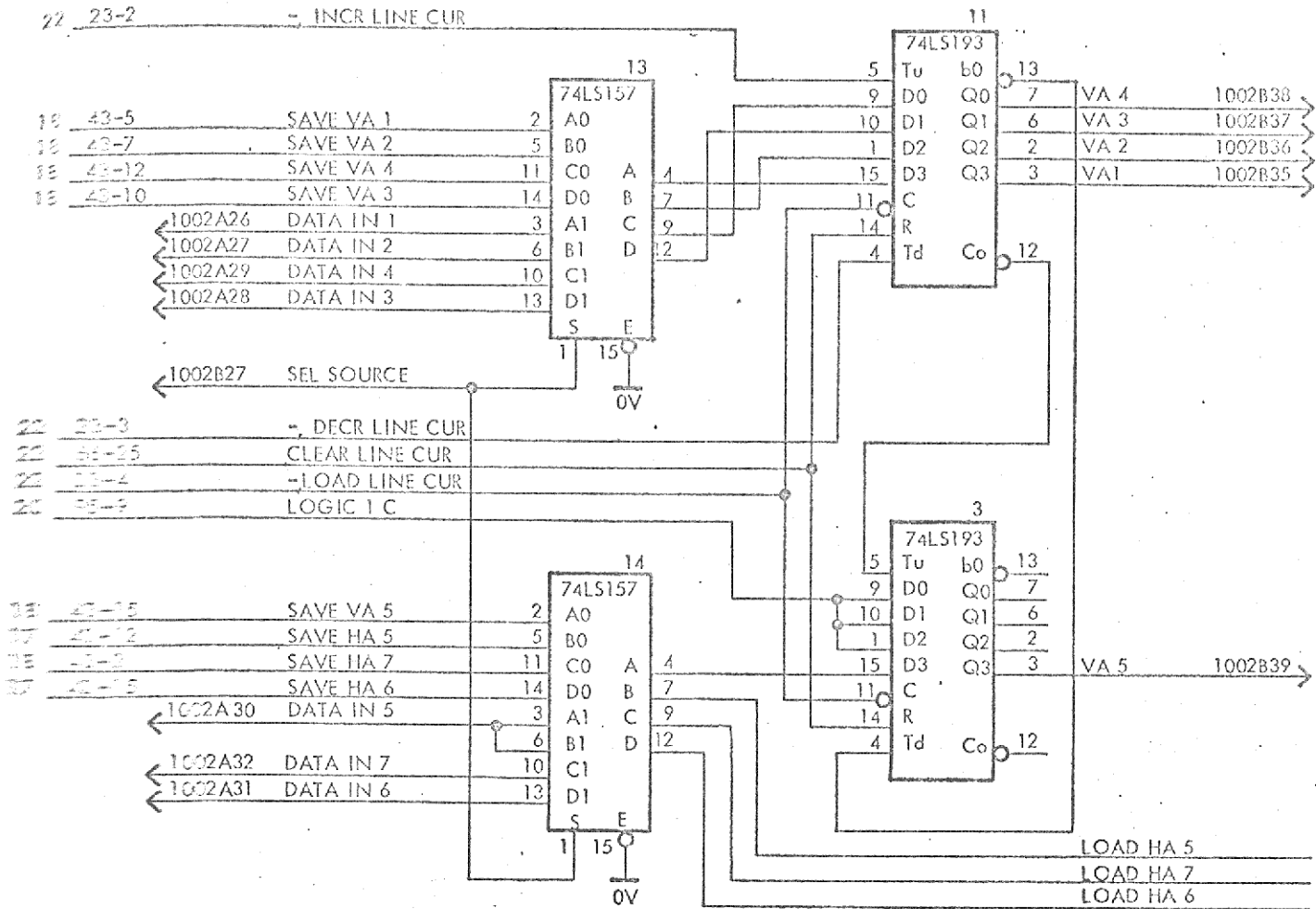


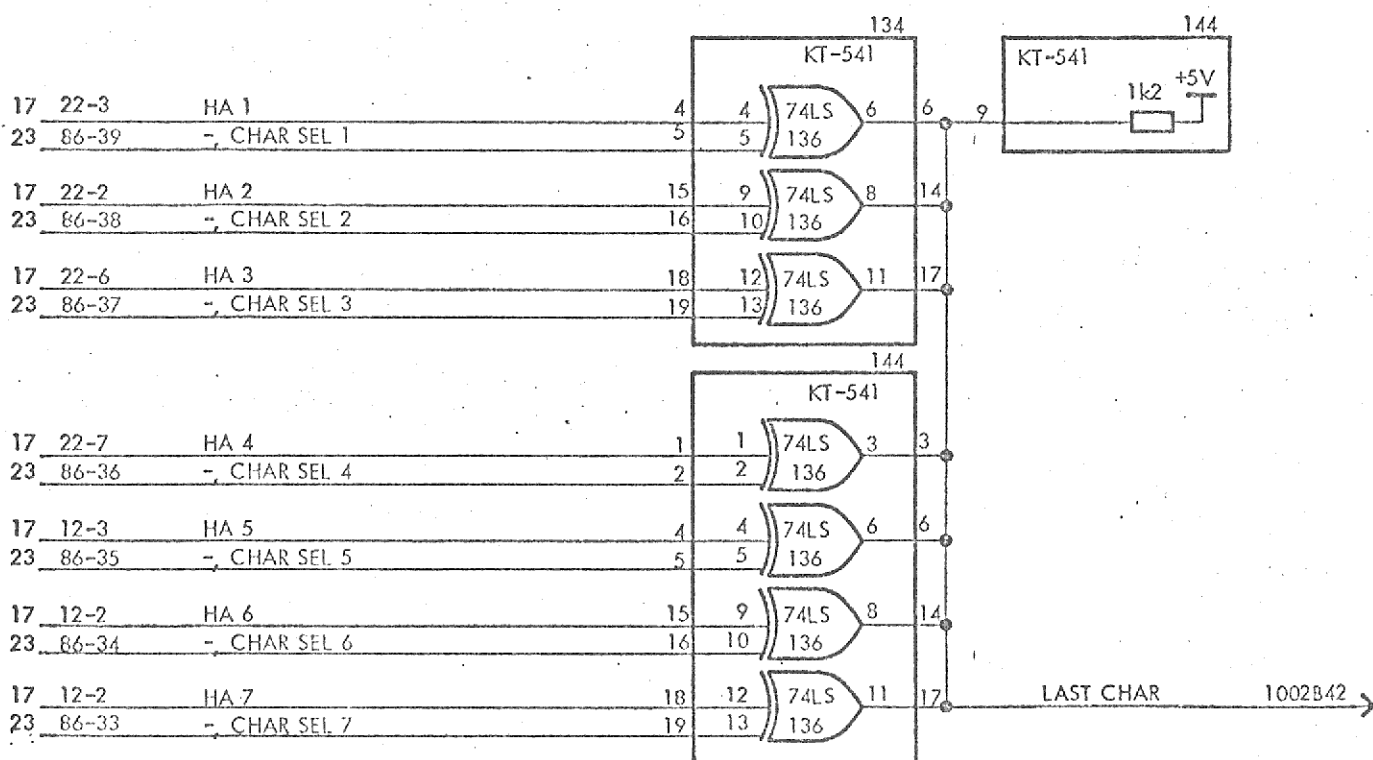
MEMORY ADDRESS CALCULATION
MEMORY SYSTEM
Circuit Diagram

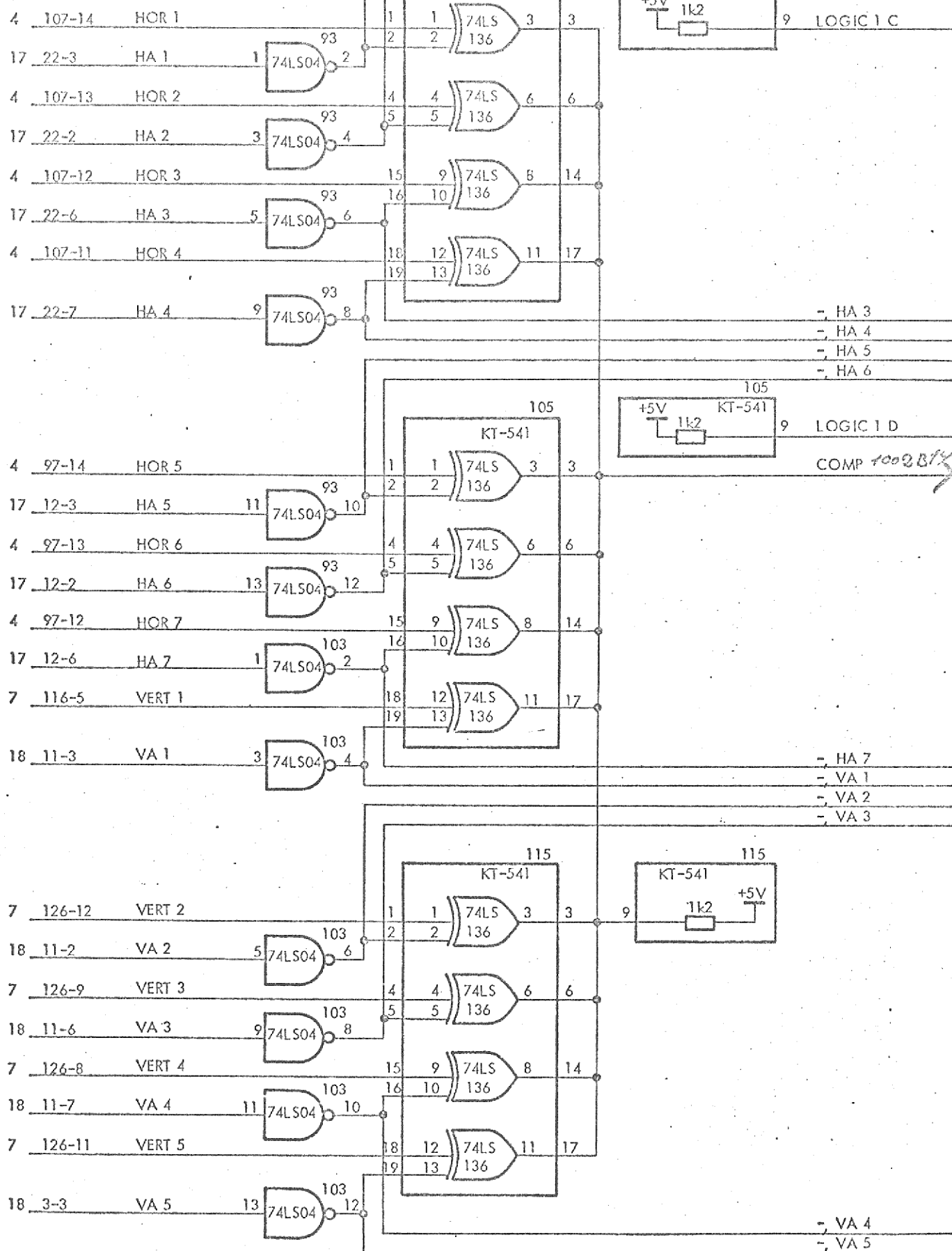


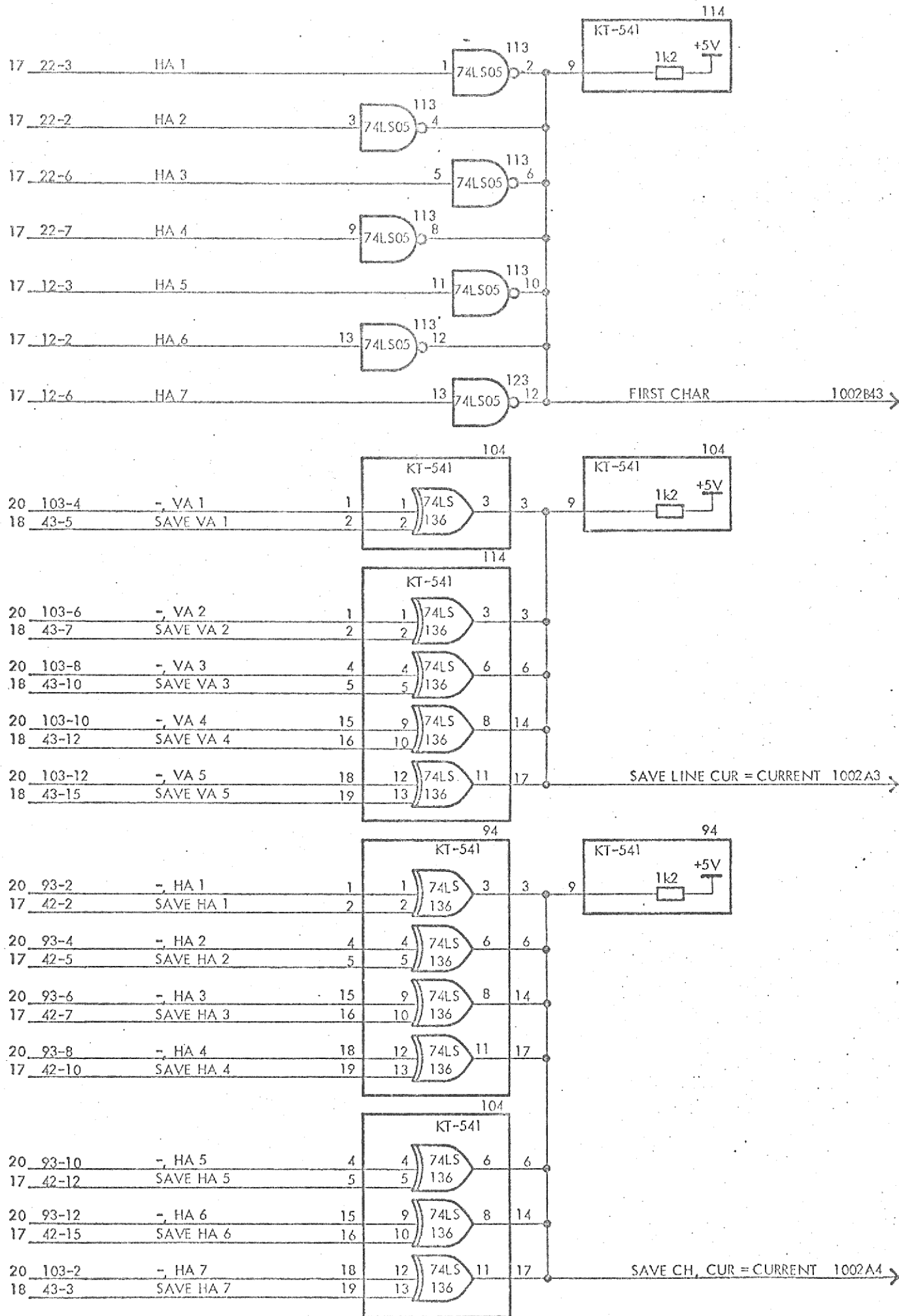
22 23-2

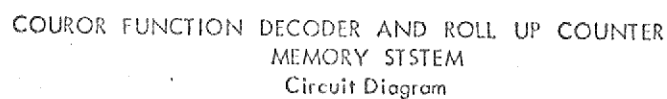
- INCR LINE CUR

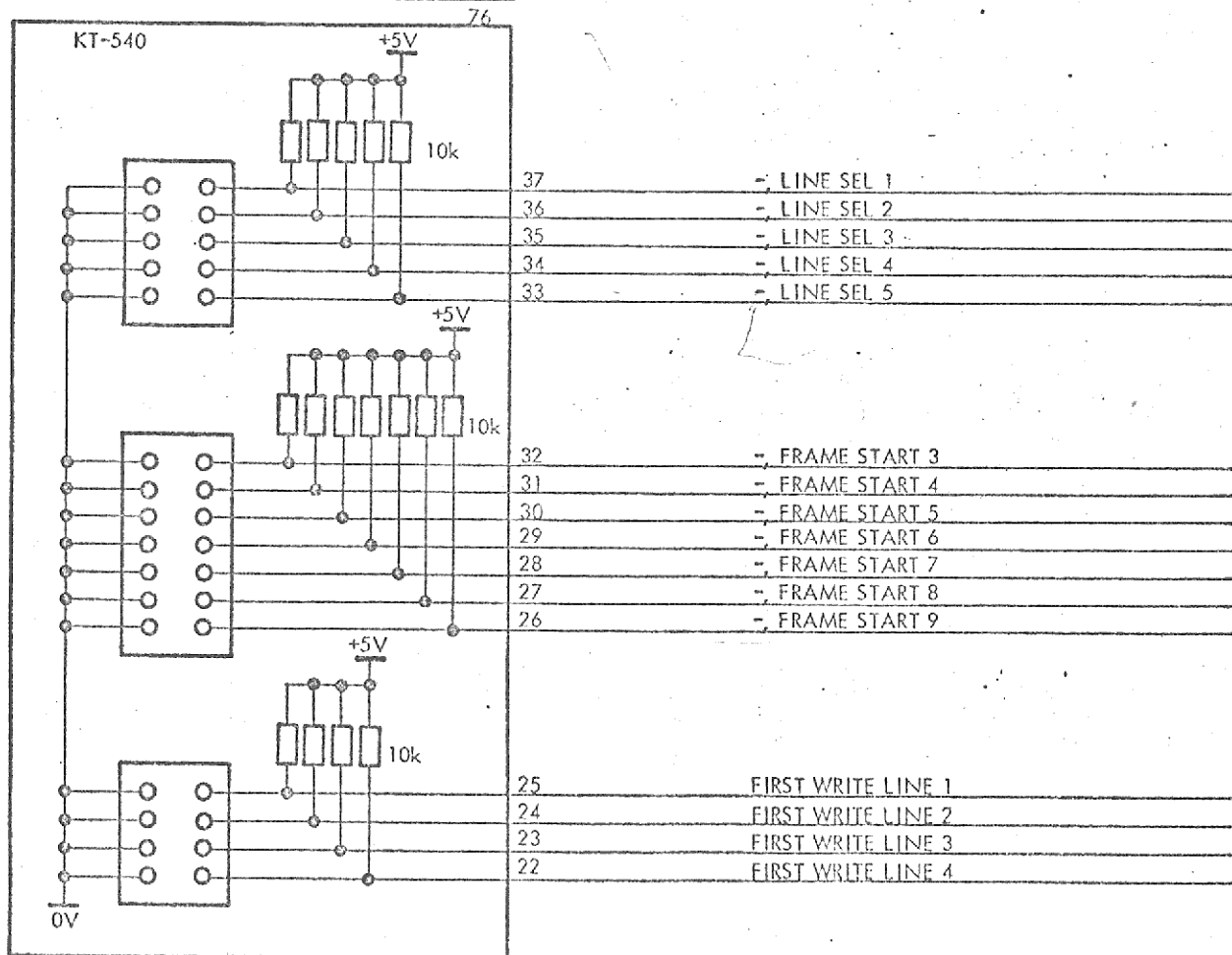
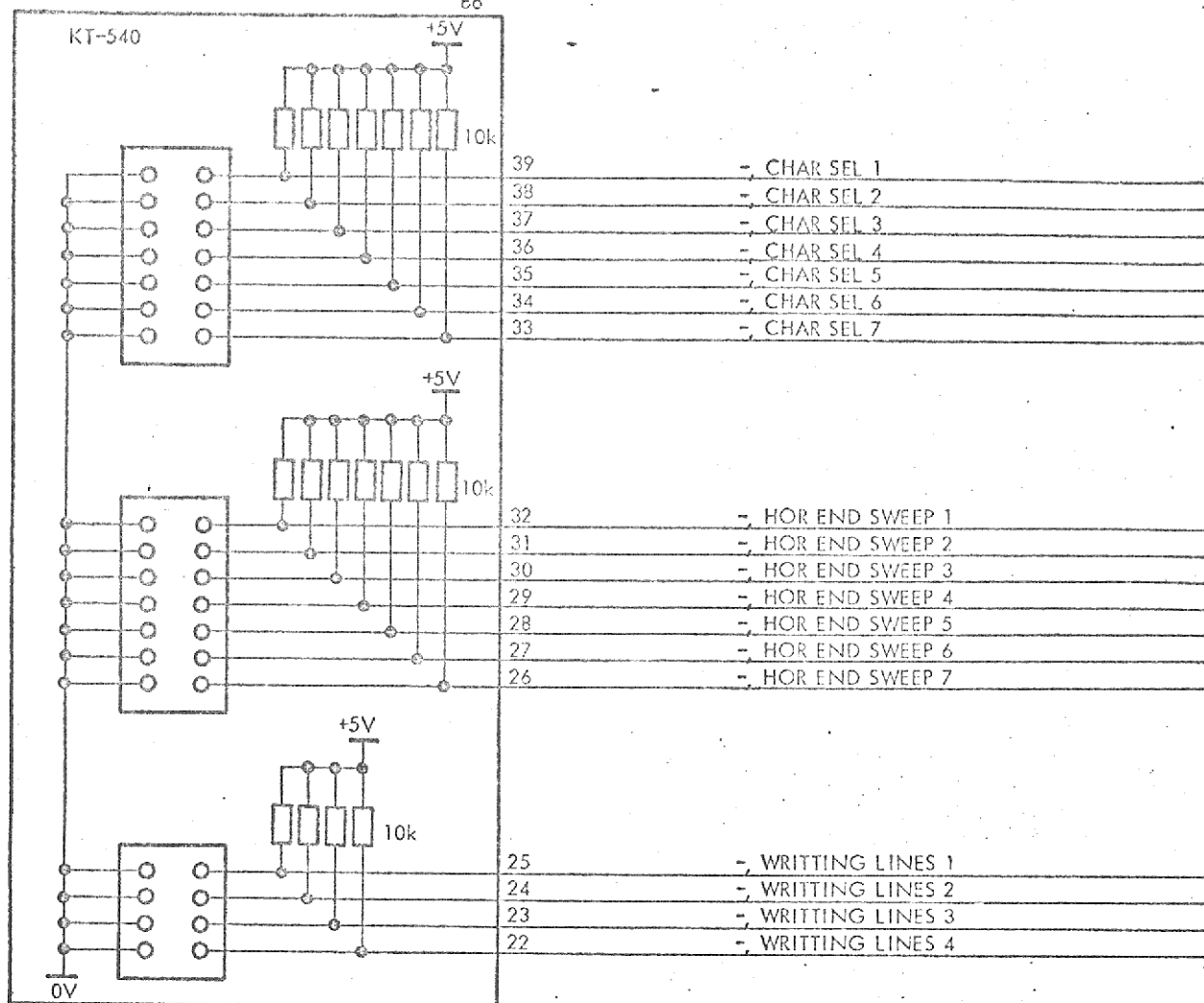


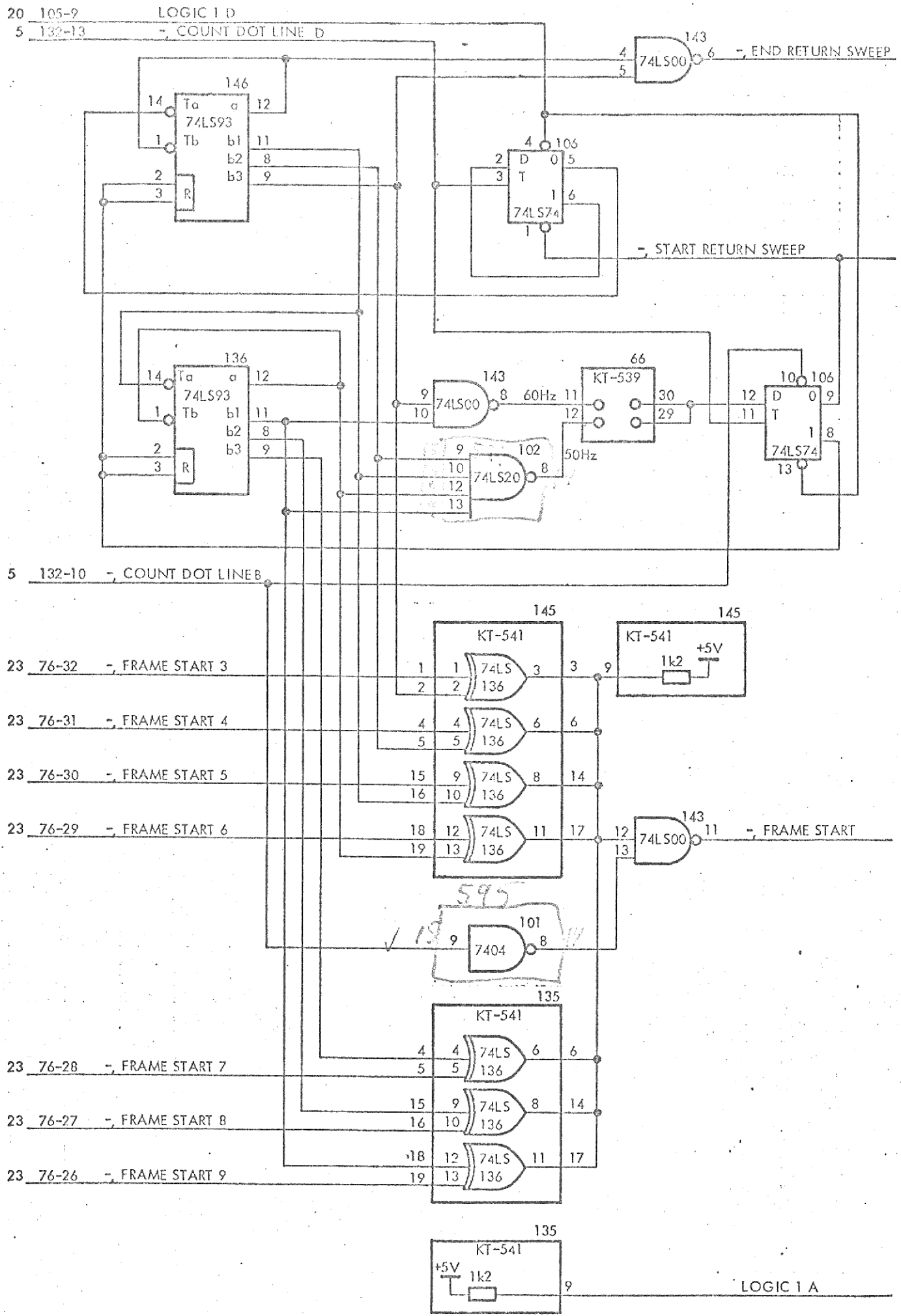




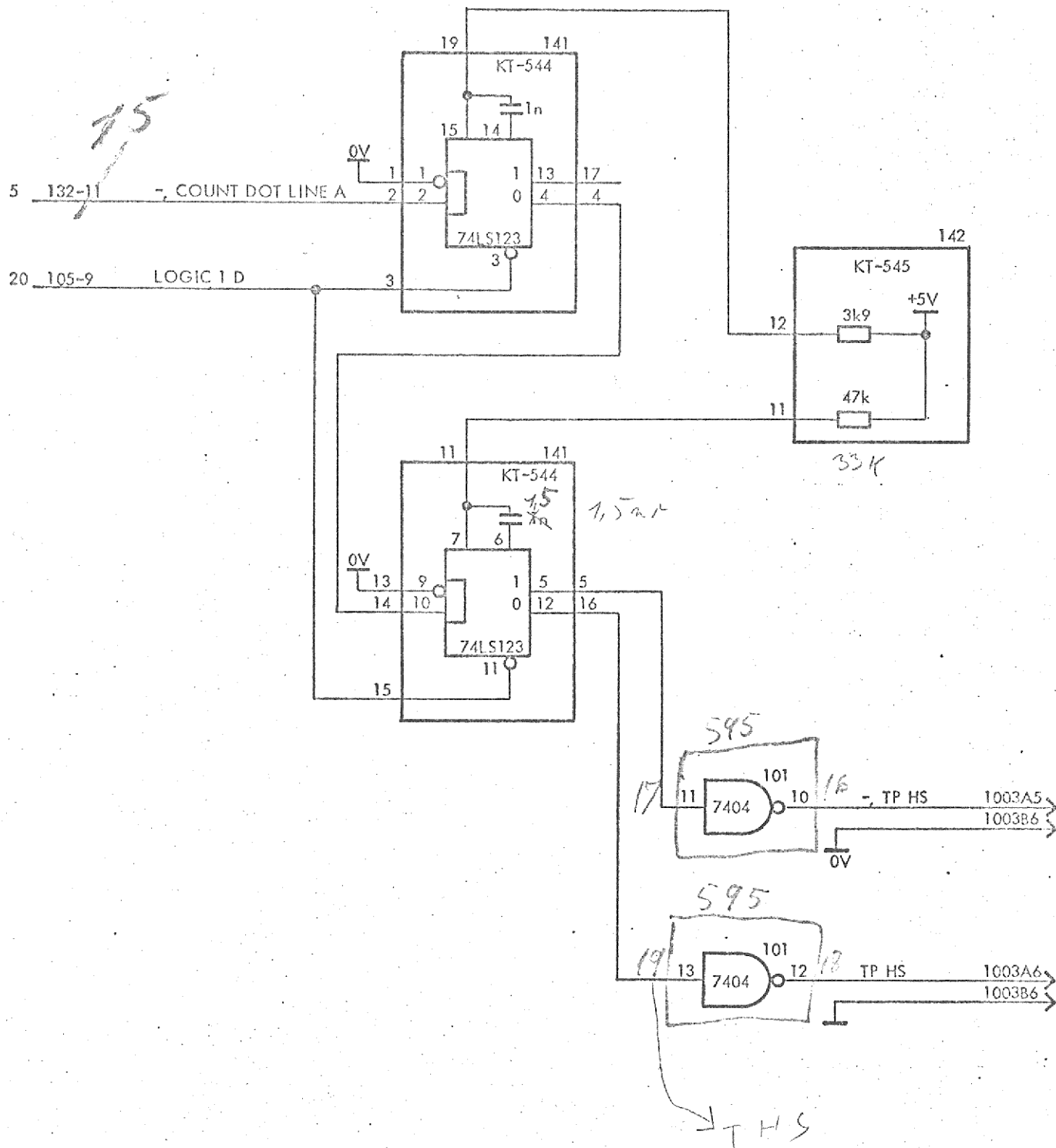








760223 K0N 760916IGH



760223 KQN 770126 IGH

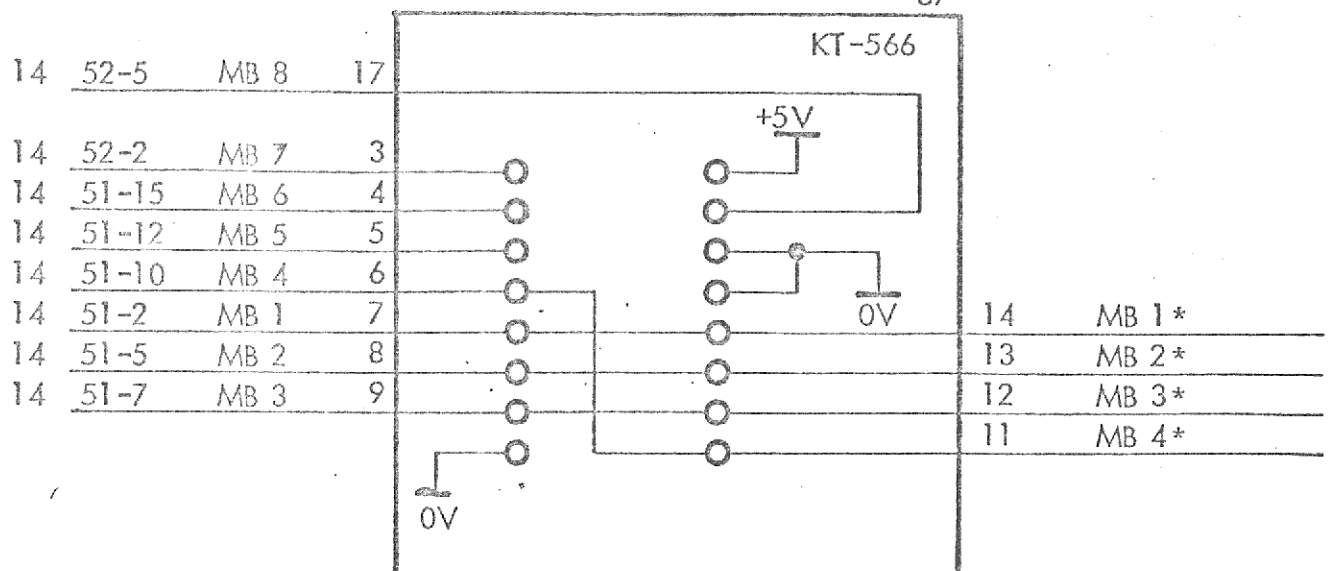
770324 BJ

770214 BJ

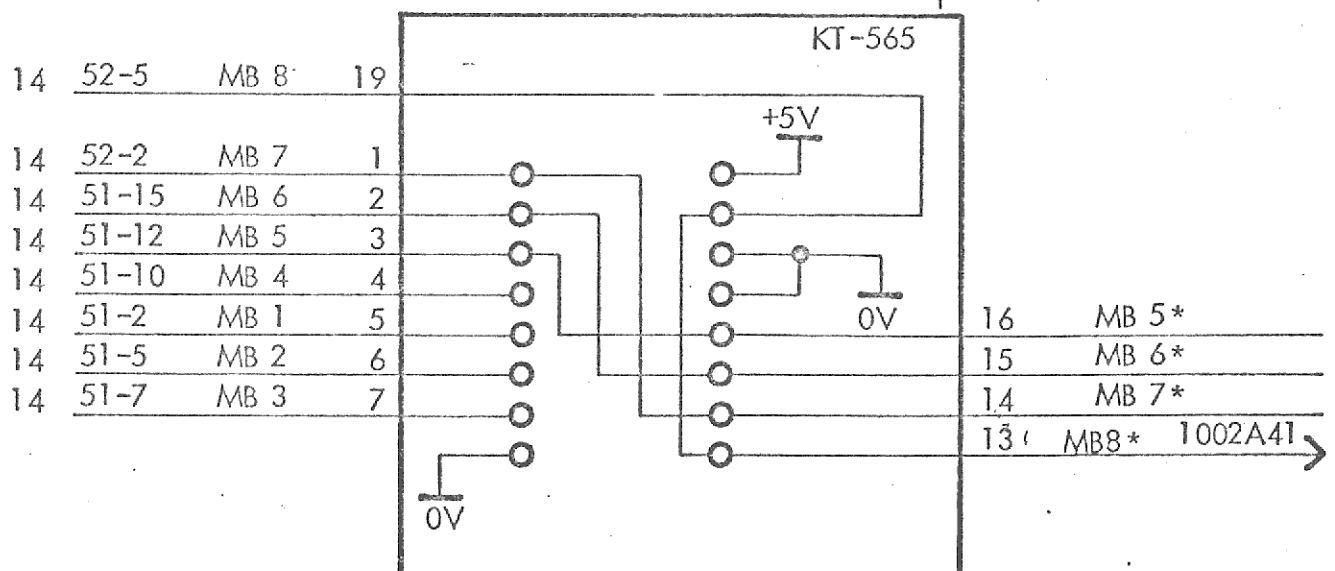
770117 IGH

760223 KΦN

67

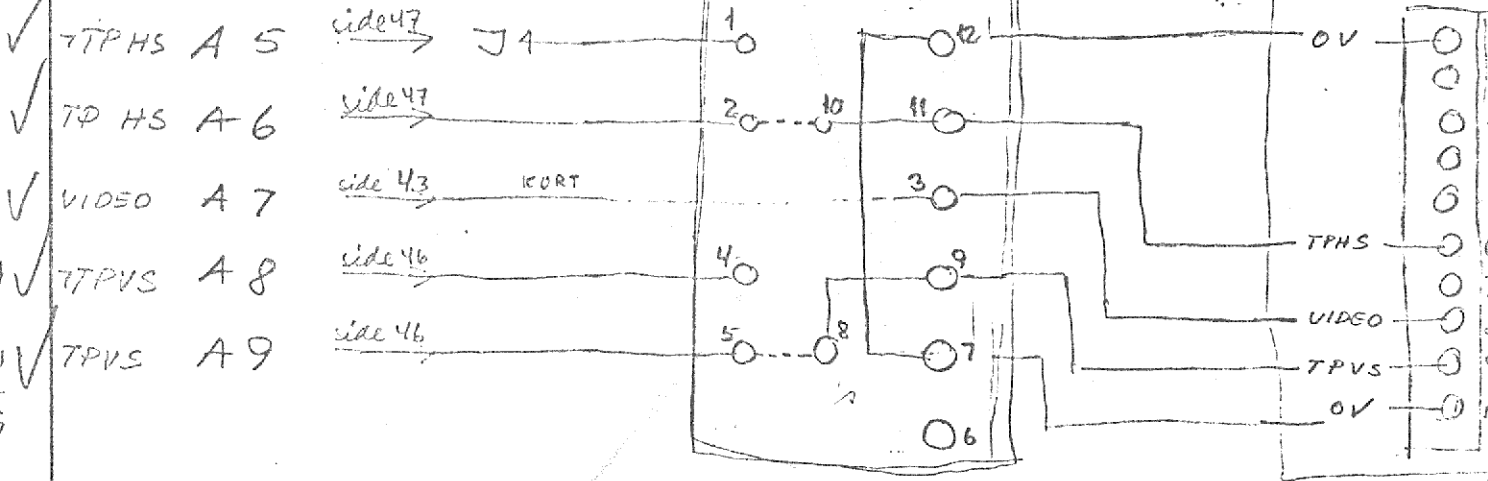


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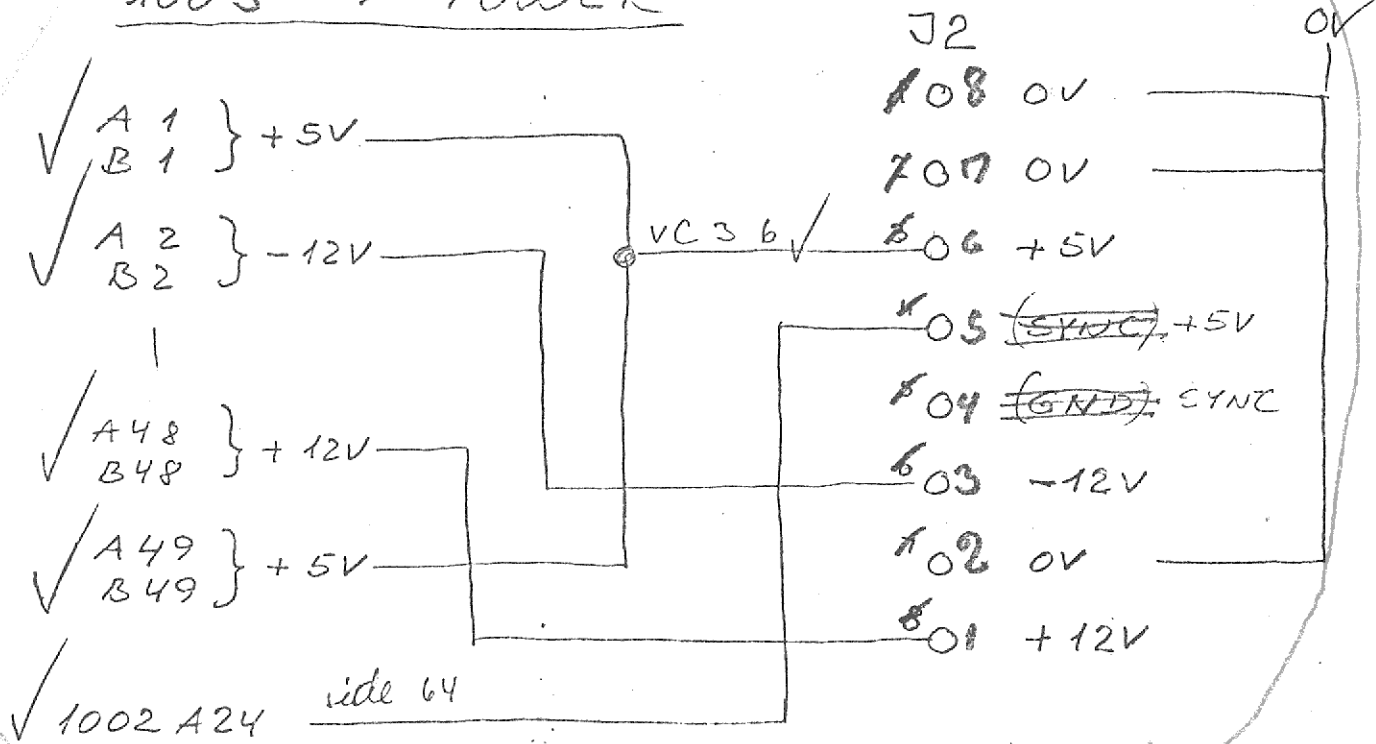


1003 — MONITOR

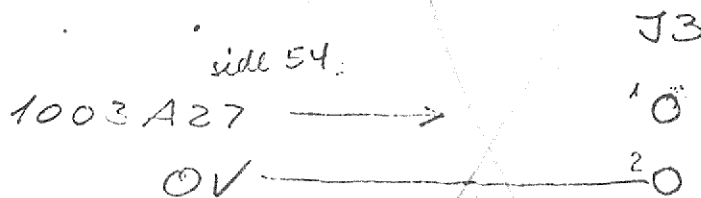
JAN 27 1982



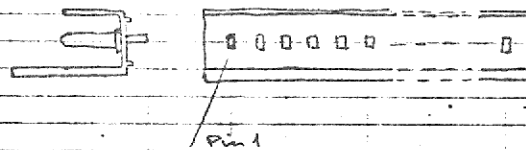
1003 → POWER



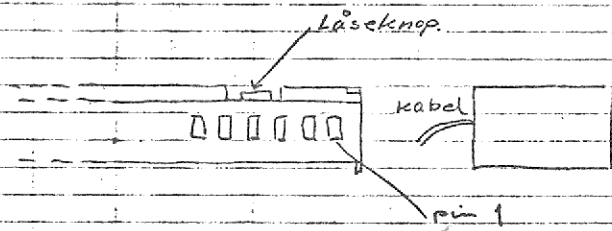
1003 → COMPOSIT SYNC



Arvid



AMPMODU I serie. part for print montage



AMPMODU I serie part for kabel montage

A/S REGNECENTRALEN

Designed by

19770630/RF

Drawn by

Dwg. Office Check

Design Check

Replaces Dwg. No.

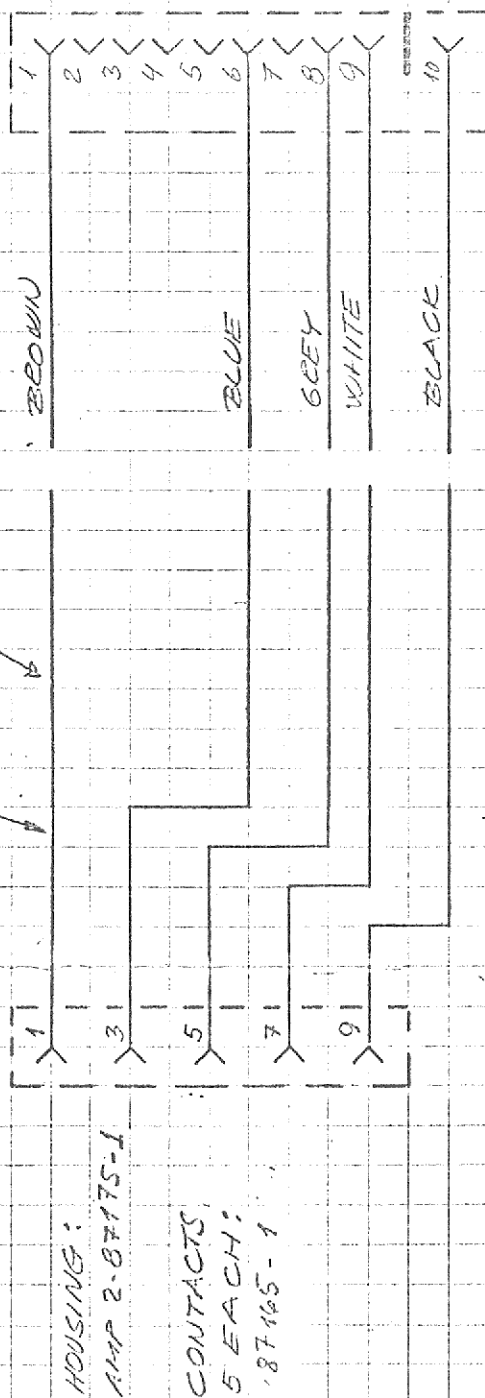
due to ECN

Replaced by Dwg. No.

Unit

RC890

Dwg. No.

MON 104-CML CABLE ASSY
CPL 524 FOR O-SERIEAWG #22
SPIRAL

A/S REGNECENTRALEN

Designed by
19770629/PS

Drawn by

Dwg. Office Check
770629 JSA

Design Check

Replaces Dwg. No.

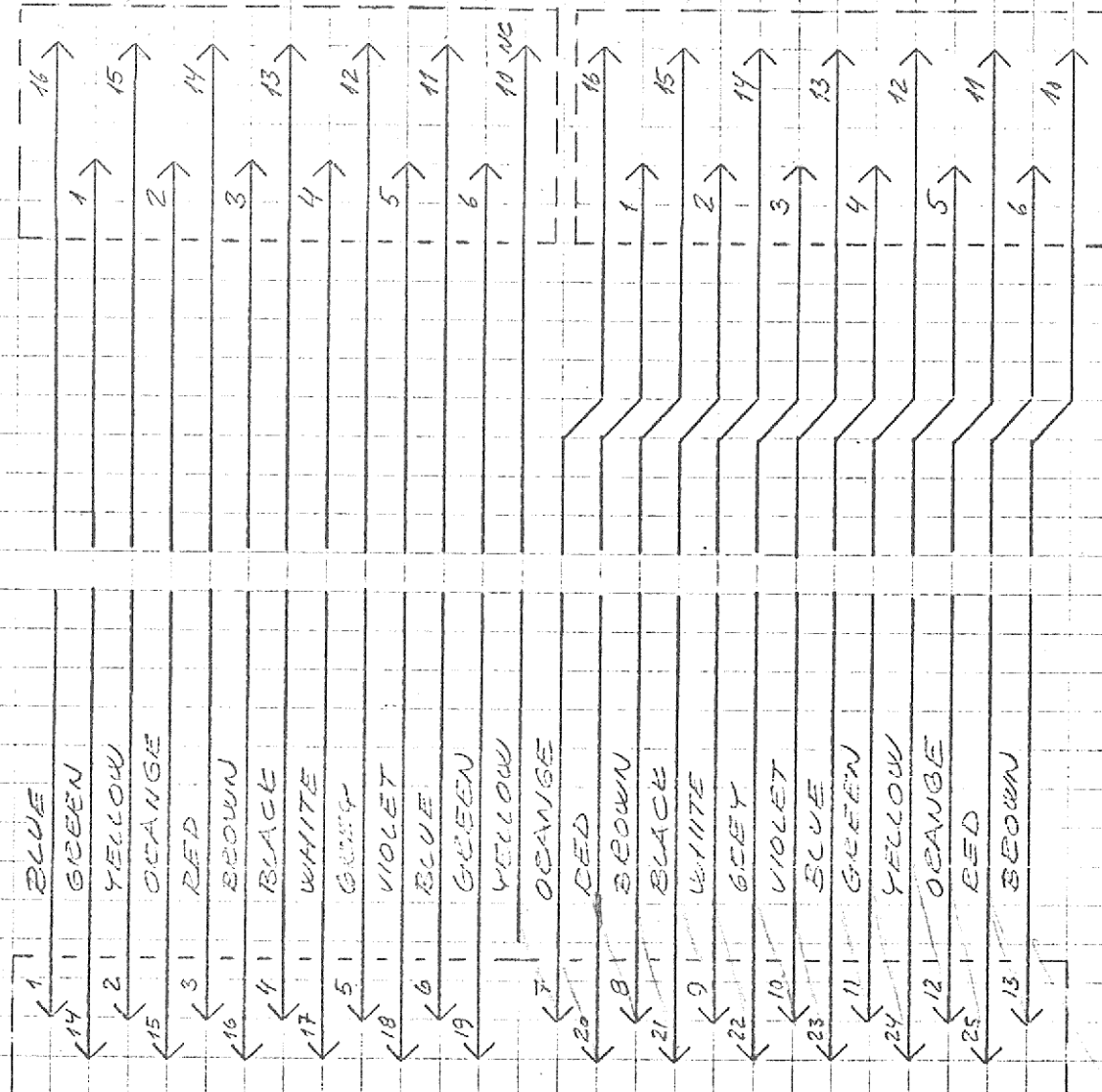
due to EGN

Replaced by Dwg. No.

Unit

RC 840

Dwg. No.



14 ——— L = 900 mm ——— 15

Alle Flachkabel

RGB CONNECTOR - PCBA CABLE ASSY

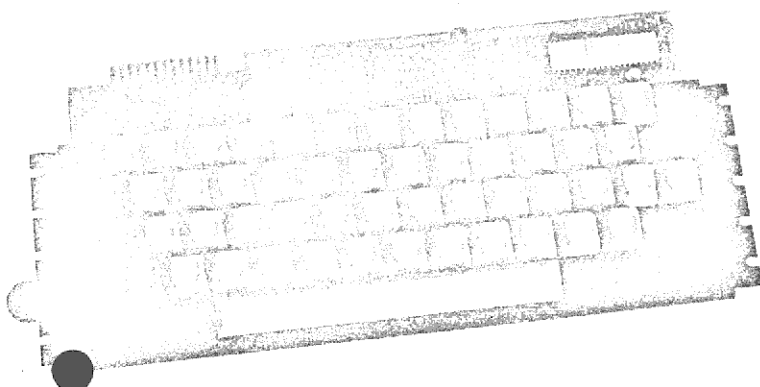
CBL 522 FOR O-SERIE

MODEL L1648

KEYBOARD

53 KEY ASR 33

53 KEY ASR 33



STANDARD FEATURES

- Low-Profile solid-state key switches
- 2-shot molded keytops
- Large-scale integration encoding
- 2-key rollover
- 5 vdc operation
- Rigid frame mounting
- Internal repeat circuitry
- Gold-plated card-edge connector
- Off-the-shelf availability
- Repeating or non-repeating strobe

OPTIONAL FEATURES

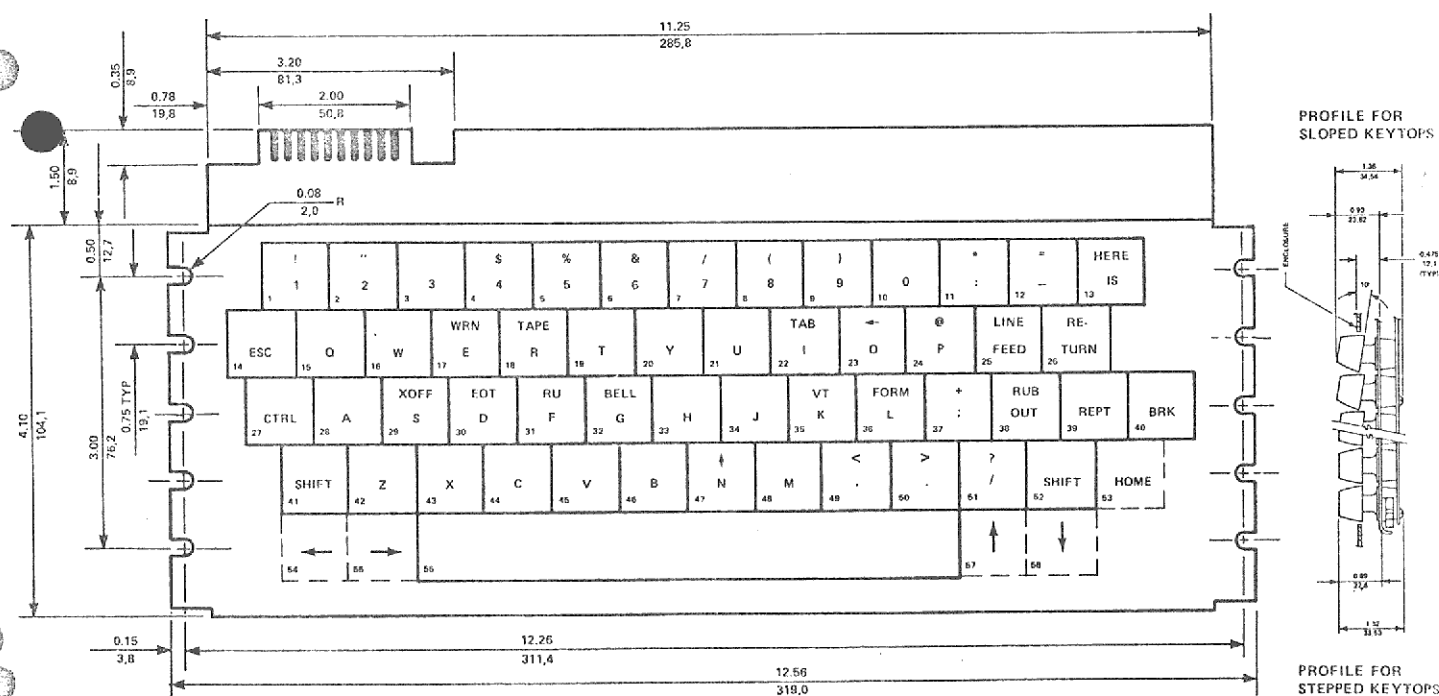
- Custom keytop colors
- Custom key forces
- 4 cursor control keys
- Custom key codes using 256x4 proms
- Custom key legends from world's largest library
- N-key rollover

DESCRIPTION

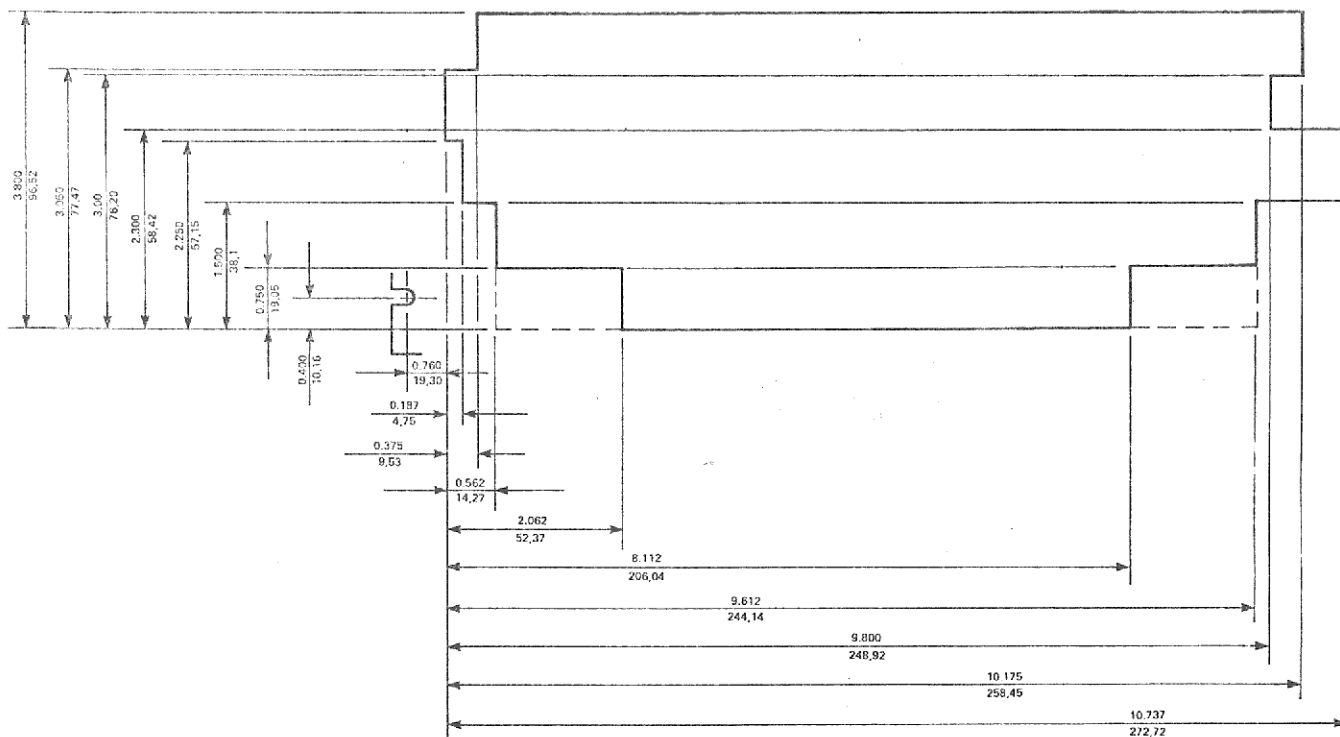
This top-of-the-line Keyboard offers the standard ASR33 format as well as the flexibility of easily changing the keytops and installing PROMS to change the key codes to create a low cost custom design. This quality keyboard combines the use of a solid-state, solderless contact, key switch with the latest state-of-the-art LSI, N-mos to provide the most reliable electronics design. In-addition,

due to the rigid mounting frame, two-shot molded keytops, and 100 million key stroke reliability, it provides the best mechanical design available.

For additional information, please contact your local Key Tronic Sales Representative. He is located in every major city in the world.



ENCLOSURE CUTOUT



CODE CHART

KEY	UNSHIFT	SHIFTED	CONTROL	CONTROL & SHIFT	KEY	UNSHIFT	SHIFTED	CONTROL	CONTROL & SHIFT
1	1	!	1	!	30	D	D	EOT	EOT
2	2	"	2	"	31	F	F	ACK	ACK
3	3	#	3	#	32	G	G	BEL	BEL
4	4	\$	4	\$	33	H	H	BS	BS
5	5	%	5	%	34	J	J	LF	LF
6	6	&	6	&	35	K	K	VT	VT
7	7	'	7	'	36	L	L	FF	FF
8	8	(	8	(	37	:	+	:	+
9	9	)	9	)	38	DEL	DEL	?	?
10	0	0	0	0	39				
11	:	:	:	:	40		REPEAT		
12	=	=	=	=	41		BREAK		
13					42	Z	Z	SUB	SUB
14	ESC	ESC	ESC	ESC	43	X	X	CAN	CAN
15	Q	Q	DC1	DC1	44	C	C	ETX	ETX
16	W	W	ETB	ETB	45	V	V	SYN	SYN
17	E	E	ENQ	ENQ	46	B	B	DC2	DC2
18	R	R	DC2	DC2	47	N		SO	RS
19	T	T	DC4	DC4	48	M	I	CR	GS
20	Y	Y	EM	EM	49	.	<	.	<
21	U	U	NAK	NAK	50	.	>	.	>
22	I	I	HT	HT	51	/	?	/	?
23	O	O	US	US	52				
24	P	@	DLE	NUL	53	US	US	US	US
25	LF	LF	LF	LF	54	BS	BS	BS	BS
26	CR	CR	CR	CR	55	HT	HT	HT	HT
27					56	SP	SP	SP	SP
28	A	A	SOH	SOH	57	VT	VT	VT	VT
29	S	S	DC3	DC3	58	LF	LF	LF	LF

ELECTRICAL DATA

Input power.....5 vdc at 250 ma
 Rollover2 Key (N-key available via jumper)
 Date output.....7 bit parallel ASC II
 Repeating or non-repeating strobe
 Strobe repeatInternal circuitry with REPEAT key

MECHANICAL DATA

Key total travel4.34 mm (0.171 in)
 Key actuating force78 grams (2.5 oz)
 Key top colorDark gray (Cyclac 3500) with
 Black control keys
 Key switch reliability>100 million MCBF

CONNECTOR DETAIL

PIN	FUNCTION	PIN	FUNCTION
1	Ground	D	Repeat Strobe
2	+5vdc	E	Repeat Strobe
3	Bit 8	F	Home
4	Bit 4	H	Repeat
5	Bit 3	J	Break
6	Bit 2	K	Here is
7	Bit	L	Control
8	Parity	M	Strobe
9	Bit 7	N	Shift
10	Bit 6		
11	Bit 5		
12	Strobe		

Recommended Connector
 Cinch P/N 50-24A-30 or equivalent

ORDERING INFORMATION

When ordering, refer to Key Tronic part number 65-1648-03. For pricing availability, consult our nearest representative located in principal cities world wide.

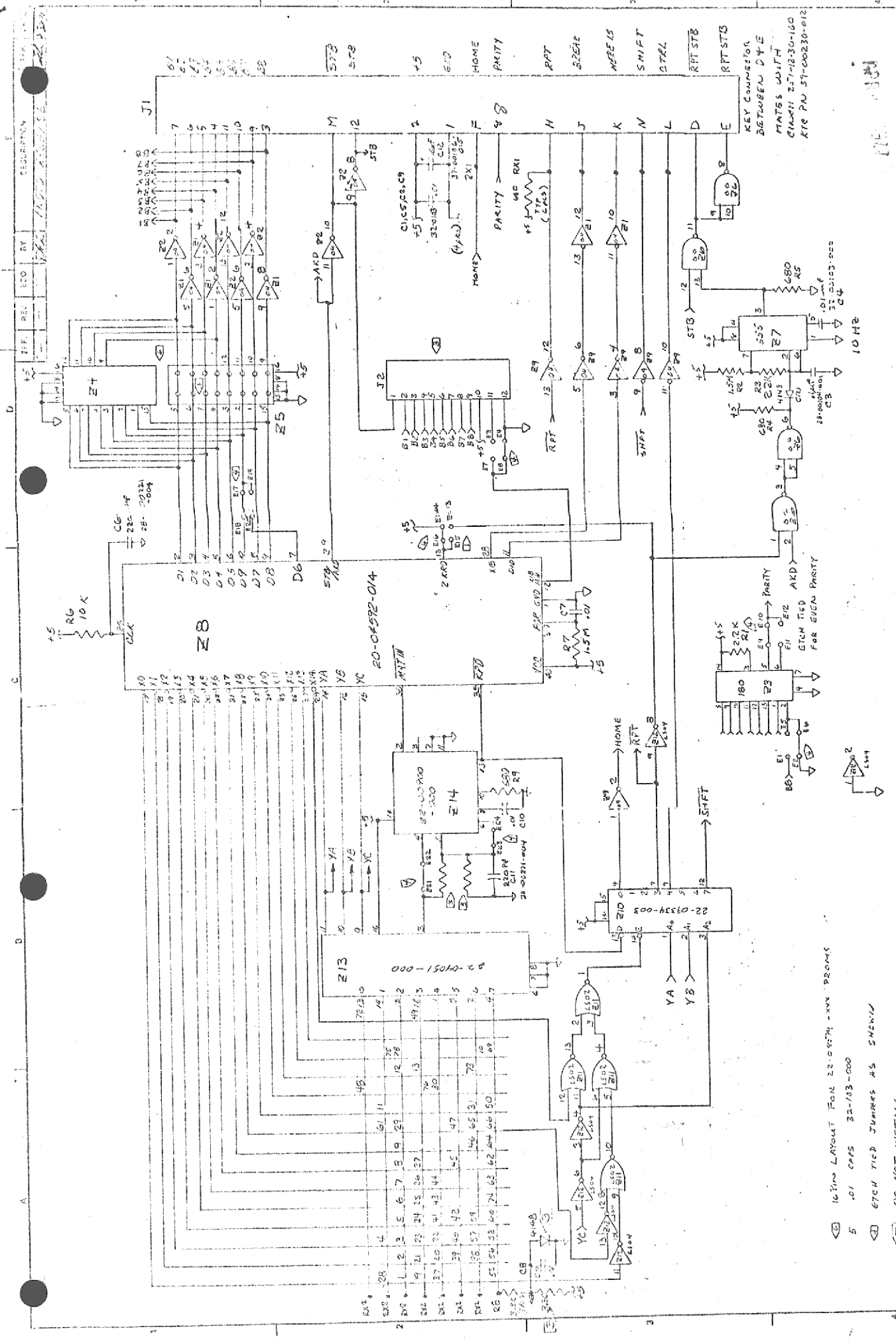
Dipl.-Ing.
TILMAN TRAUT
 Lindenstraße 49
 D 7024 Filderstadt-1
 Tel: 0711/703711



key tronic

Principal Cities Worldwide

P.O. BOX 14687 SPOKANE, WA 99214 USA
 TELEPHONE 509-928-8000 TWX 510 773-1885



ITEM		PART NO.		DESCRIPTION	
SCALE	SCALE	SCALE	SCALE	SCALE	SCALE
1:1	1:1	1:1	1:1	1:1	1:1
NOTES: 1. DIMENSIONS TO BE FOR 2.000 ±.005 2. FOR 2.000 WITH 2.000 ±.005 3. DO NOT INSTALL 4. EACH TIED JUMPS AS SHOWN 5. 101 CANS 32-103-000 6. 101 LAYOUT FOR 22-0074-000 PAGES					
DATE: 10/10/74 BY: [Signature] CHKD: [Signature] APPD: [Signature] REV: 1					

FIELD CHANGE ORDER

NO. INTERN

ISSUE WEEK

RCSL: 44 - RT 1634

MANDATORY	☐	RETROFIT ON FAILURE	☐
WARRANTY	☐	NON WARRANTY	☐

PAGE	1	OF	2
RE: ECN NO:			

SERIAL EFFECTIVITY	EQUIPMENT AFFECTED
	RC 841

NOTE
Indførelse af Æ, Ø og Å på RC 841 displayet.

REASON FOR CHANGE
Fra RC 841 tastaturet kan der skrives [, \ og] ved brug af henholdsvis "upper case K, L og M"; dette kan ændres til skrivning af Æ, Ø og Å ved udskiftning af ELITE karaktergeneratoren MMA 3094 på SML 100 pos. 74 til karaktergeneratoren SCM 39713.

DESCRIPTION OF CHANGE
Løft MMA 3094 karaktergeneratoren ud ved hjælp af neglene eller en skruestrækker og isæt SCM 39713.

ADDITIONAL COMMENTS
Over K, L og M på tastatur knapperne påklæbes labels med håndskrevne Æ, Ø og Å. Det kan ikke lade sig gøre at skrive æ, ø og å fra tastaturet, men de kan skrives fra line (computeren).

QTY:	PARTS REQUIRED	RC -P/N
1	SCM 39713	

DOCUMENTATION ENCLOSED
KT-538, med indtegnet pos. 74.

KITS FREE OF CHARGE FROM ISS:	YES ☐	NO ☐
RETURN CHANGED PARTS TO ISS:	YES ☐	NO ☐

ESTIMATED INSTALLATION TIME:

PROJECT ENGINEER		DEVELOPMENT MANAGER		SYS. PRODUCTION MANAGER		TECH. SERVICE MANAGER	
SIGN.	DATE	SIGN.	DATE	SIGN.	DATE	SIGN.	DATE
		<i>Ellgaard</i>	5-9-78				

Unit

Dwg. No.

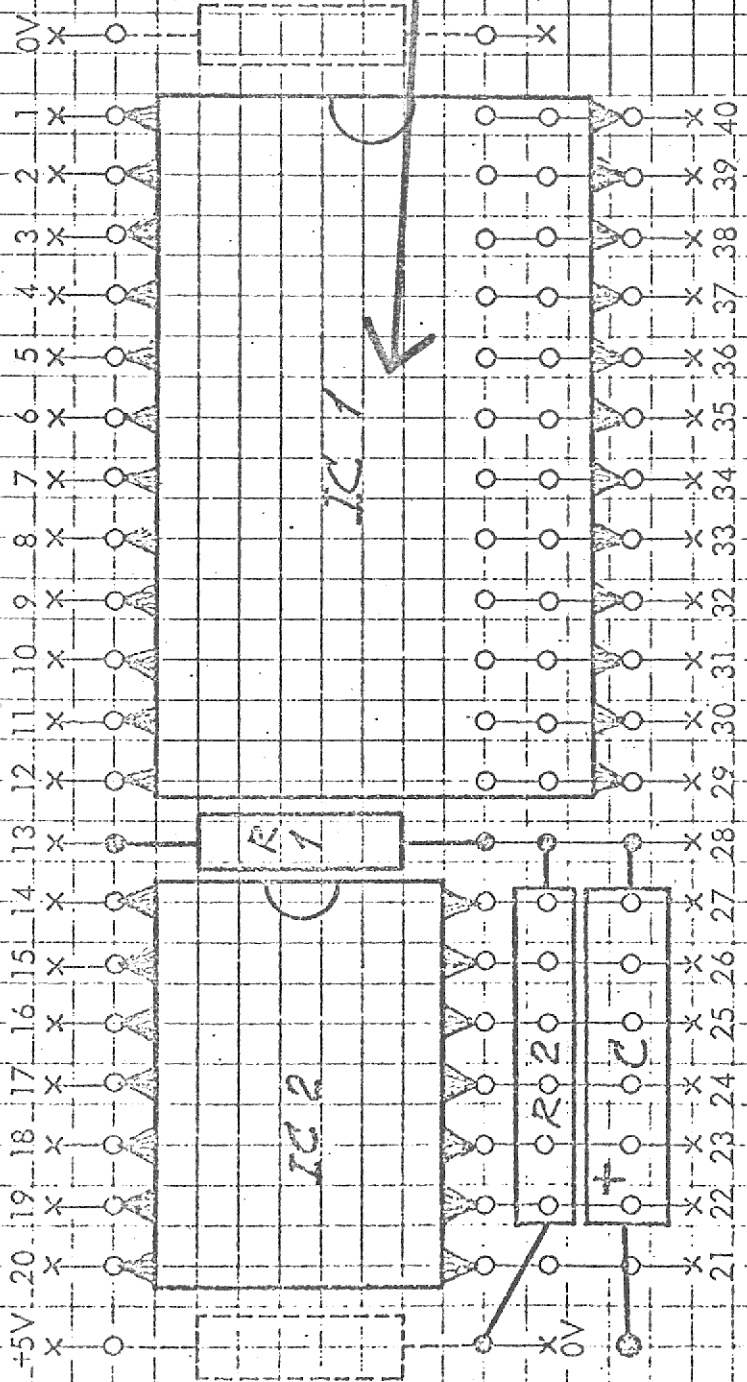
Kredsløp: 2T-538

Montage:

Set fra komponentsiden

Intern tråkning:

0V - 29
0V - 20
+5V - 27
+5V - 22
28 - 1



Pos. 74

Komponenter: IC1: (MCM 65XX (70LXX L79) eller tilsvarende) DIP-40 SOCKET

IC2: 74LS30

R1: 1k 1/8W

R2: 360E 1/8W

C: 47µF/6V TANTAL